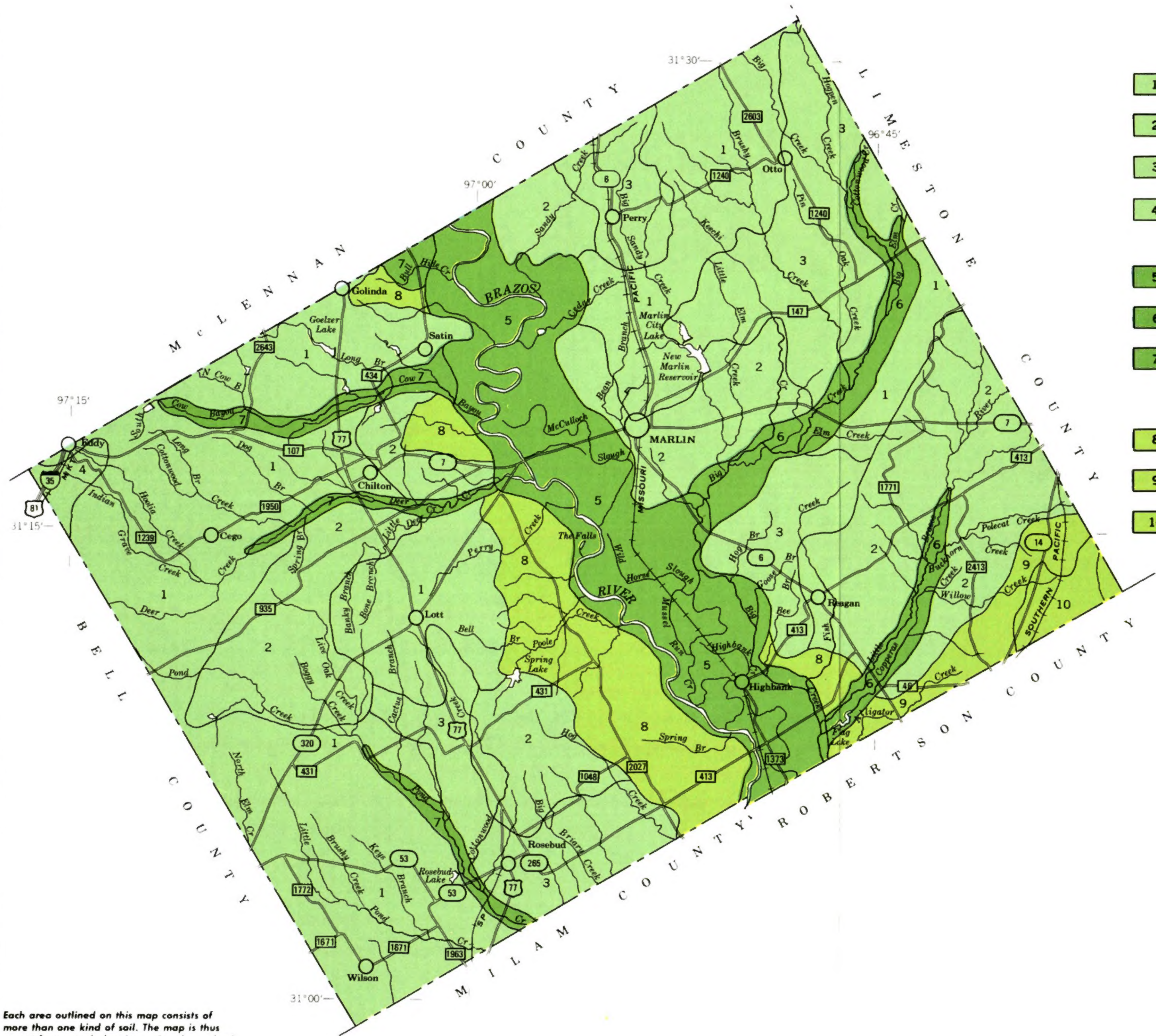


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND

MODERATELY DEEP TO DEEP, CLAYEY AND LOAMY SOILS ON UPLANDS

1	HOUSTON BLACK–HEIDEN: Nearly level to sloping, calcareous, very slowly permeable, clayey soils.*
2	CROCKETT–WILSON: Nearly level to gently sloping, noncalcareous, very slowly permeable, loamy soils.
3	WILSON–BURLESON: Nearly level to gently sloping, noncalcareous, very slowly permeable, loamy and clayey soils.
4	AUSTIN–ALTOGA: Gently sloping to strongly sloping, calcareous, moderately permeable to moderately slowly permeable, clayey soils.

DEEP, CLAYEY AND LOAMY SOILS ON FLOOD PLAINS

5	SHIPS–WESWOOD: Nearly level, calcareous, moderately permeable to very slowly permeable, clayey and loamy soils.
6	GOWEN–TRINITY: Nearly level, noncalcareous and calcareous, moderately permeable to very slowly permeable, clayey and loamy soils.
7	OVAN–TRINITY: Nearly level, calcareous, very slowly permeable, clayey soils.

DEEP, SANDY AND LOAMY SOILS ON UPLANDS AND HIGH STREAM TERRACES

8	SILAWA–AXTELL: Nearly level to sloping, noncalcareous, moderately permeable to very slowly permeable, loamy soils.
9	AXTELL–TABOR: Nearly level to sloping, noncalcareous; very slowly permeable, loamy soils.
10	SILSTID–PADINA: Nearly level to gently sloping, noncalcareous, moderately permeable to moderately slowly permeable, sandy soils.

* Texture and calcareousness refer to the surface layer unless otherwise mentioned.

Compiled 1977

N

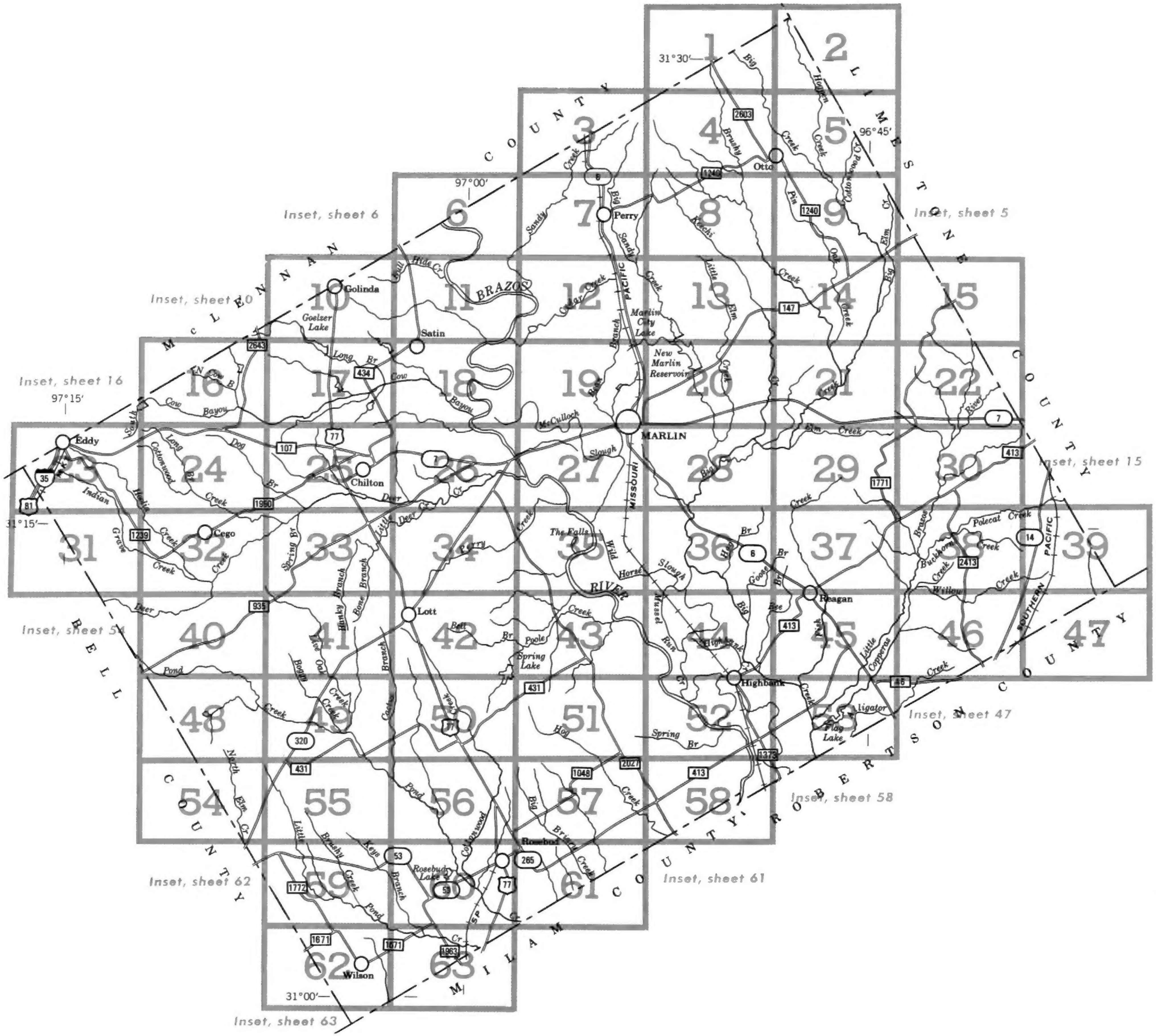
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

FALLS COUNTY, TEXAS

Scale 1:253,440

1 0 1 2 3 4 Miles



INDEX TO MAP SHEETS

FALLS COUNTY, TEXAS

Scale 1:253,440

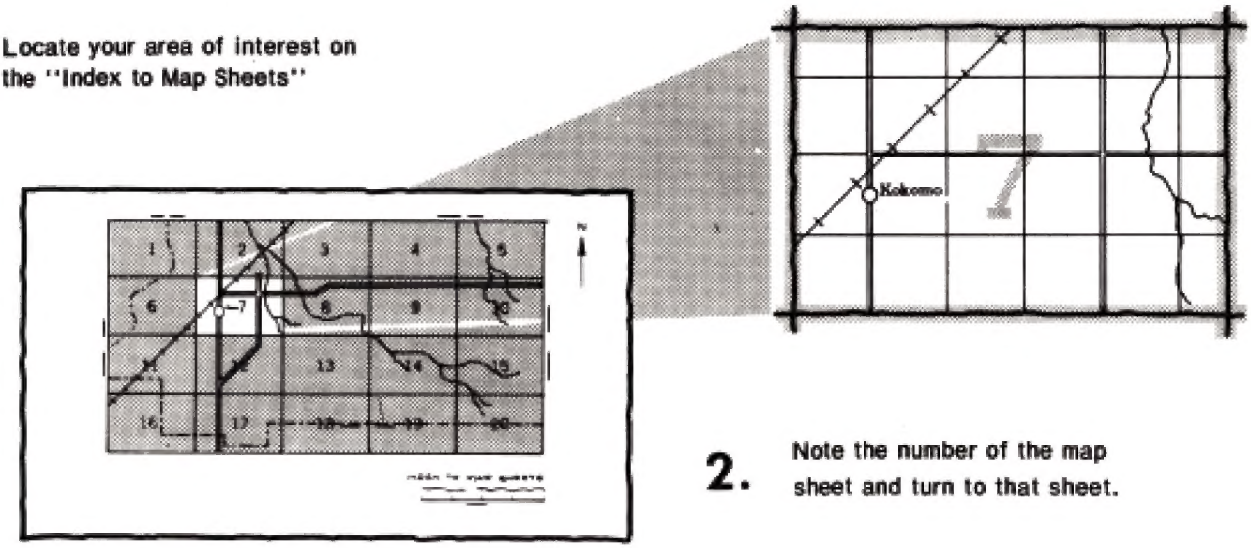
SOIL SURVEY OF

Falls County, Texas

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Texas Agricultural Experiment Station

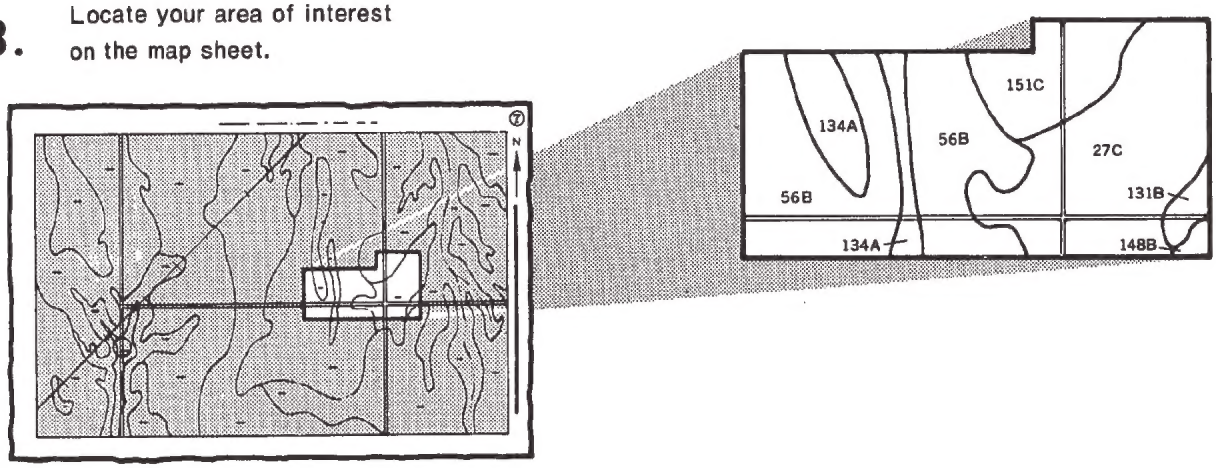
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

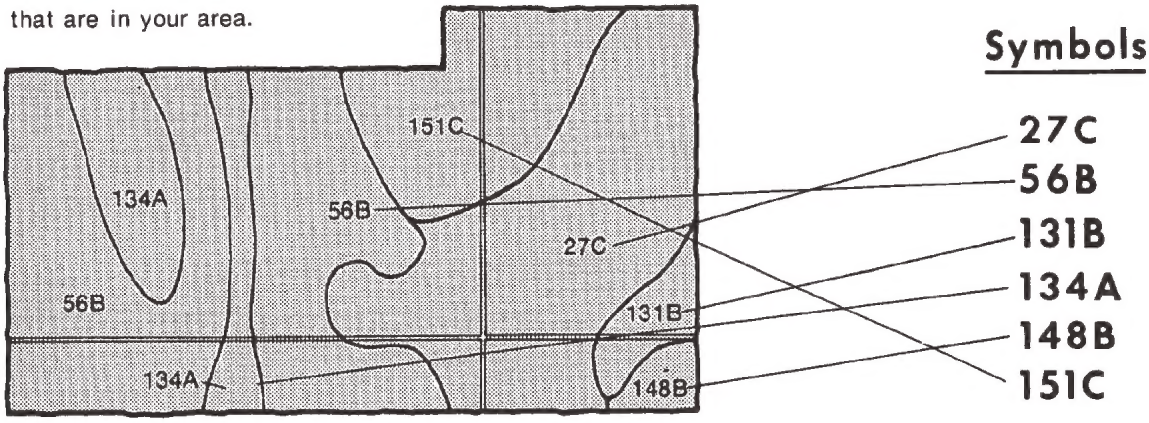


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.

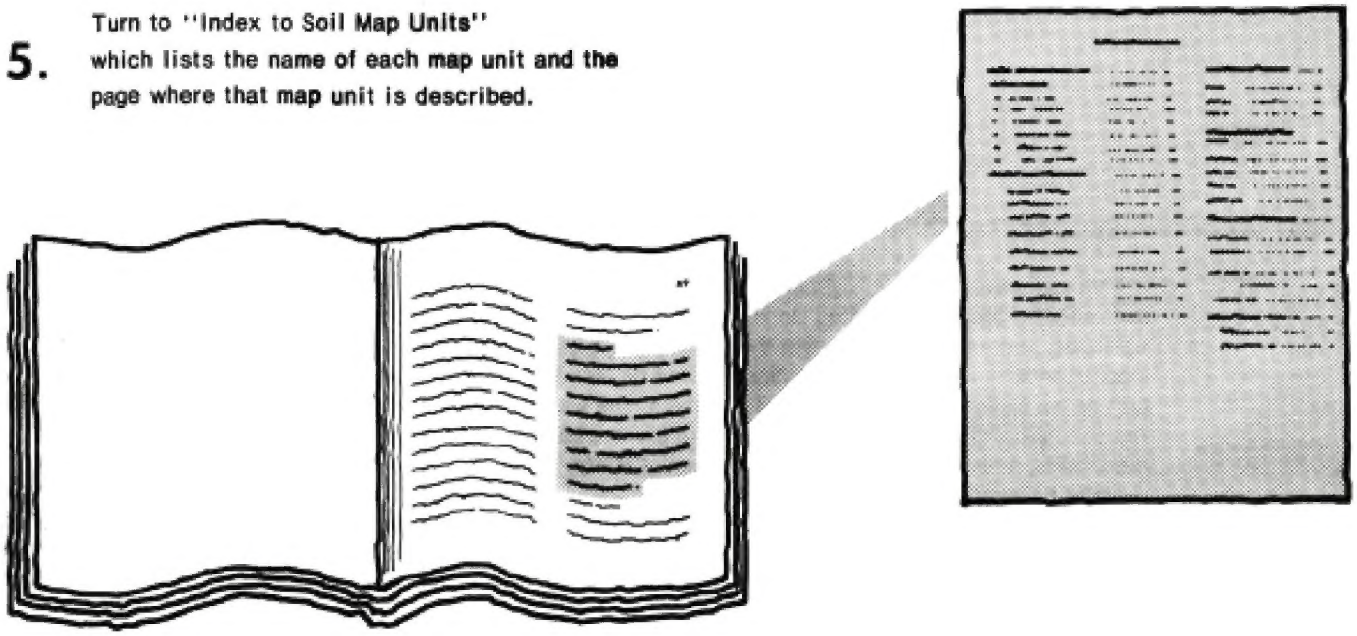


4. List the map unit symbols that are in your area.

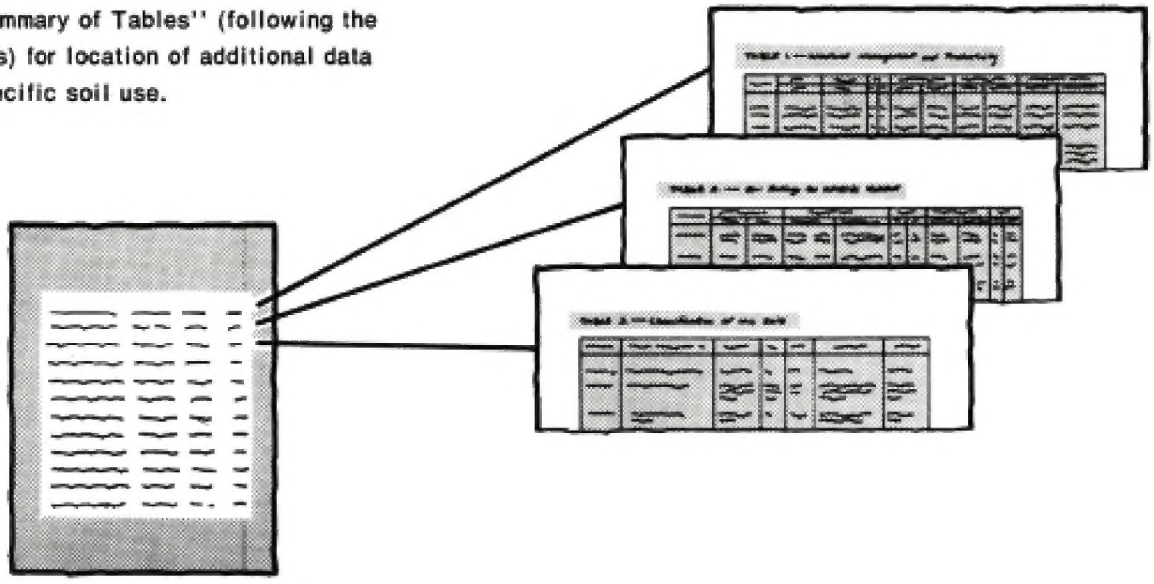


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1969-73. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1973. This survey was made cooperatively by the Soil Conservation Service and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the Central Texas Soil and Water Conservation District and the Limestone-Falls Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Post oak and blackjack oak growing on Padina fine sand, 0 to 5 percent slopes. This soil is in the Deep Sand range site.

Contents

Issued August 1978

Index to Soil Map Units

Summary of Tables

Summary of Tables—Continued

Foreword

The Soil Survey of Falls County, Texas, contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

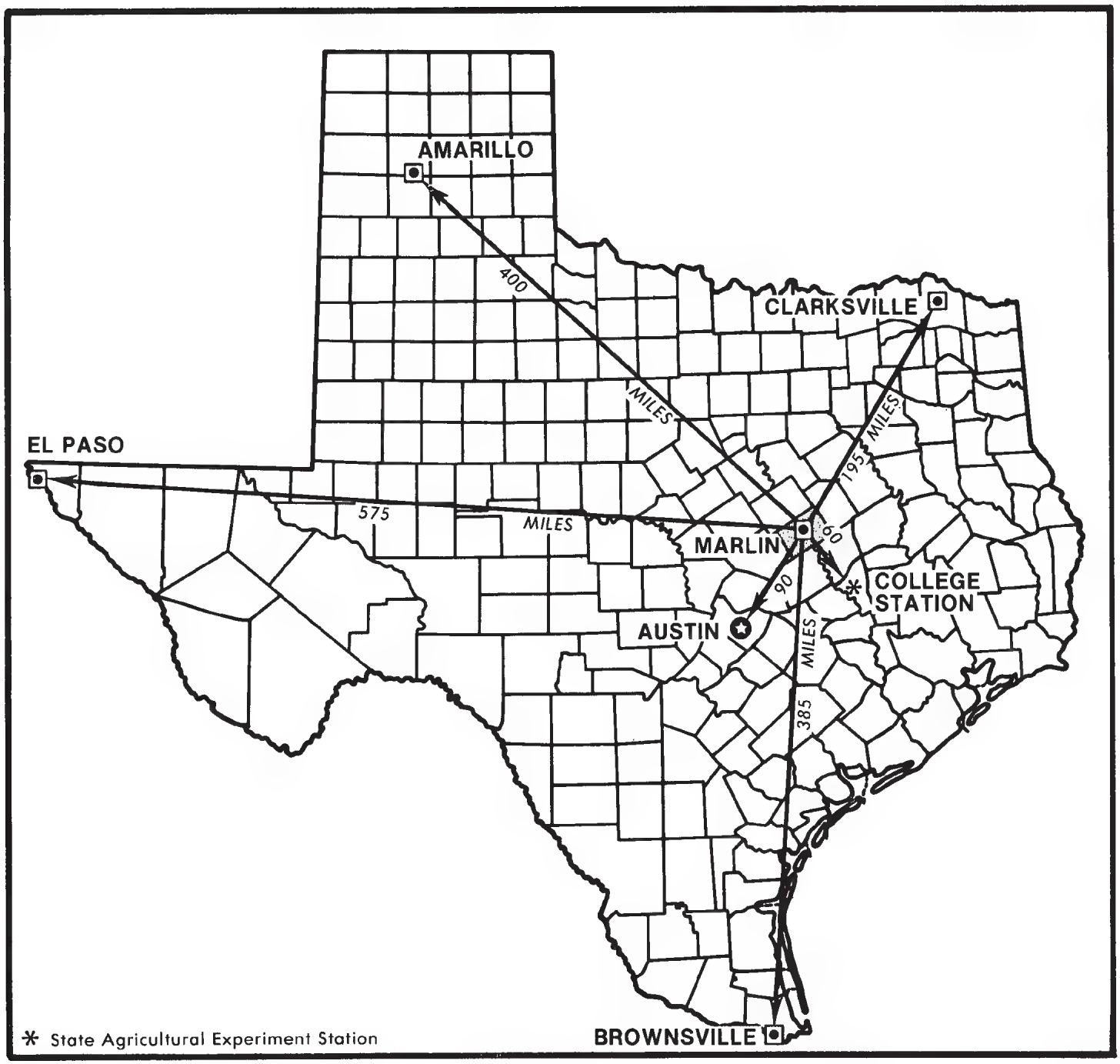
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

George C. Marks
State Conservationist
Soil Conservation Service



Location of Falls County in Texas.

SOIL SURVEY OF FALLS COUNTY, TEXAS

By Jim C. Wyrick, Soil Conservation Service

Soils surveyed by Jim C. Wyrick, David R. Thompson, John W. Huckabee, Jr
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with Texas Agricultural Experiment Station

FALLS COUNTY is in the east-central part of Texas. (See map on facing page.) In 1972 the county had a population of 16,700; Marlin, the county seat, had a population of 6,391. The total area of the county is 489,600 acres, or 765 square miles.

In general the relief is undulating to rolling with some broad flatlands. The Brazos River, which passes through the center of the county, is in a shallow valley 2 to 3 miles wide. The largest streams are Little Brazos River and Big Creek. Flood plains along these streams are 1/4 mile to 1 mile wide. The general slope of the county is to the southeast. The elevations range from 300 to 500 feet above sea level; however, an extreme elevation of about 700 feet is in the northwest corner of the county.

General nature of the county

This section provides general information on the climate, history, natural resources, and farming in Falls County.

Climate

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Riesel, Texas, for the period 1938 to 1972.

In winter the average temperature is 49.8 degrees F, and the average daily minimum temperature is 39.2 degrees. The lowest temperature on record, which occurred at Riesel on February 13, 1949, is 2 degrees. In summer the average temperature is 82.4 degrees, and the average daily maximum temperature is 93.2 degrees. The highest recorded temperature, which occurred on July 11, 1943, is 115.5 degrees.

The total annual precipitation is 33.85 inches. Of this total, 18.27 inches, or 54 percent, usually falls in April through September, which includes the growing season for most crops. The wettest year was 1957, when the total precipitation was 58.43 inches. The driest year on record was 1954; the total precipitation that year was only 18.22 inches. July generally is the driest month of the year.

Snowfall is usually of little consequence. It often melts as rapidly as it falls and does not accumulate.

The pattern of the relative humidity is fairly uniform throughout the year, but the humidity varies considerably during the day. The average annual relative humidity is 83 percent at dawn and 52 percent at sunset. The percentage of possible sunshine is 62 percent. The prevailing wind is in a southerly direction throughout the year. The strongest persistent windspeed occurs in March and April.

The average length of the warm season (the number of days free of freezing temperatures) is 257 days. The average date of the last occurrence of 32 degrees F in spring is March 9. The first occurrence of 32 degrees F in fall, on the average, is November 24.

Climatic data in this section were specially prepared from records at the Agricultural Experiment Station, Riesel, Texas.

History

BILLY R. MAREK, District conservationist, Soil Conservation Service, assisted in writing this section.

The history of Falls County began at the Falls of Brazos River. In early times these falls had become widely known as a meeting place for adventurers, prospectors, and travelers from both Texas and the United States. As late as the 1830's, authoritative accounts reveal, only a few settlers lived in the Falls area. This area was occupied mostly by the Caddo Tribe, from which Texas derived its name.

By 1846 the Falls area was divided into two counties: Milam and Limestone. Their county seats, Springfield and Cameron, were 40 miles away from the Falls.

In 1849 the people of the Falls area petitioned the Texas State Legislature for a new county and a county seat that would be nearer the people. On January 28, 1850, an act creating Falls County was passed by the legislature.

The county seat was given the name Marlin in memory of the Marlin family. Previously, it had been known as

Adams (for Dr. Adams who lived nearby), because the residents listed it as "Adams" when they voted.

Falls County became a prosperous agricultural area because of the fertile soils along the Brazos River.

Natural resources

Soil is the most important natural resource in the county. Forage for livestock and food and fiber for market and home consumption are produced from the soils of the county and are the major source of livelihood.

Water is adequate for home use and farming in all parts of the county. Several wells supply water for supplemental irrigation of crops.

A few oil and gas wells are in the county.

Mineral artesian water wells at sanatoriums in Marlin annually attract many persons.

Farming

The total land area of Falls County is 489,600 acres. Of this area, 19,800 acres is urban land and 2,470 acres is areas of water less than 40 acres in size. Thus, the total usable land is 467,330 acres. Approximately 296,380 acres of this is cropland, 112,960 acres is pasture, 26,000 acres is rangeland, 22,500 acres is woodland, and 9,440 acres is land used for other purposes.

In Falls County the "Conservation Needs Inventory" (*5*) indicates that cropland is being converted to pasture. Warm-season grasses have been planted in these converted areas, and these grasses are the predominant vegetation. The inventory does not indicate a trend to convert cropland from cotton to grain sorghum or to cool-season broadcast crops of small grain for stocker cattle. Approximately 16,000 acres of the Brazos River bottom land is irrigated. The irrigated crops are cotton, alfalfa, grain sorghum, and warm-season grasses.

Agricultural income is derived principally from cattle, hogs, turkeys, grain sorghum, such small grain as wheat and oats, cotton, and vegetables.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures (*6*).

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils

having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Moderately deep to deep, clayey and loamy soils on uplands

The soils in this group make up about 71 percent of the county. The major soils are in the Houston Black, Heiden, Crockett, Wilson, Burleson, Austin, and Altoga series. They are nearly level to sloping and are on uplands and high stream terraces. The soils have a clayey or loamy surface layer and a clayey underlying layer. These soils are somewhat poorly drained to well drained, and they are very slowly permeable to moderately permeable.

The soils are used mainly for cultivated crops and pasture. The major crops are cotton and grain sorghum. Improved bermudagrass, kleingrass, and King Ranch bluestem are the principal improved pasture grasses. Native plants are little bluestem, indiangrass, switchgrass, big bluestem, and an overstory of live oak, elm, and hackberry that are along drainageways.

The soils in this group have low potential for urban and recreational uses because of high shrink-swell potential, slow percolation, low strength, and high corrosivity to uncoated steel. They have medium potential for openland wildlife habitat.

1. Houston Black-Heiden

Nearly level to sloping, calcareous, very slowly permeable, clayey soils

The soils of this map unit are on uplands. Areas are scattered throughout the county. These soils formed in alkaline marine clays and material weathered from shales. Alluvial soils are in areas of the well-defined drainageways.

This map unit occupies about 33 percent of the county. Houston Black soils make up about 32 percent of the unit, and Heiden soils make up about 32 percent. The remaining 36 percent is minor soils (fig. 1).

The Houston Black soils have a very dark gray, moderately alkaline clay surface layer about 28 inches thick. Between depths of 28 and 48 inches is dark gray, moderately alkaline clay. Between depths of 48 and 67 inches is olive gray, moderately alkaline clay. The underlying layer to a depth of 80 inches is coarsely mottled olive yellow and light brownish gray, moderately alkaline clay that has brownish yellow mottles.

The Heiden soils have a dark grayish brown, moderately alkaline clay surface layer about 21 inches thick. Below the surface layer to a depth of 45 inches is grayish brown, moderately alkaline clay that has light yellowish brown mottles. The underlying layer to a depth of 80 inches is yellow, moderately alkaline shaly clay.

Houston Black soils are on smooth ridges and in valleys, and Heiden soils are on side slopes. Houston Black soils are moderately well drained, and Heiden soils are well drained. Both the Houston Black and the Heiden soils are clay throughout the profile; they are very hard when dry and very plastic and sticky when wet.

The minor soils in this map unit are the well drained Lott, Altoga, and Ferris soils; the moderately well drained Branyon soils; and the somewhat poorly drained Trinity soils.

This map unit is used mainly for cultivated crops and pasture. Water erosion is the major hazard.

This map unit has high potential for cultivated crops, pasture, and range. It has low potential for urban uses because the soils have high shrink-swell potential, slow percolation, high corrosivity to uncoated steel, and low strength. Potential for recreation is low because the soils are too clayey and are very slowly permeable. This unit has medium potential for openland wildlife habitat.

2. Crockett-Wilson

Nearly level to gently sloping, noncalcareous, very slowly permeable, loamy soils

The soils of this map unit are on uplands and high stream terraces. Areas are scattered throughout the county. These soils formed in alkaline marine clays and material weathered from shales interbedded with sandier material.

This map unit occupies about 22 percent of the county. Crockett soils make up about 35 percent of the unit, and Wilson soils make up 30 percent. The remaining 35 percent is minor soils (fig. 2).

The Crockett soils have a brown, medium acid fine sandy loam surface layer about 9 inches thick. Between depths of 9 and 17 inches is mottled brownish yellow and red, medium acid clay that has grayish brown mottles. Between depths of 17 and 29 inches is mottled, yellow and grayish brown, medium acid clay that has reddish yellow mottles. Between depths of 29 and 42 inches is brown, slightly acid clay that has brownish yellow mottles. Between depths of 42 and 53 inches is brownish yellow, neutral clay that has light brownish gray and reddish yellow mottles, and between depths of 53 and 73 inches is yellow, moderately alkaline sandy clay loam that has light brownish gray, white, and yellowish brown mottles. The underlying layer to a depth of 80 inches is mottled yellow, light gray, and brownish yellow, moderately alkaline sandy clay loam.

The Wilson soils have a dark gray, mildly alkaline silty clay loam surface layer about 6 inches thick. Below the surface layer to a depth of 25 inches is dark gray, mildly alkaline clay. Between depths of 25 and 39 inches is gray, mildly alkaline clay, and between depths of 39 and 58 inches is gray, moderately alkaline clay that has light yel-

lowish brown mottles. The underlying layer to a depth of 80 inches is light olive gray, moderately alkaline clay that has yellowish brown mottles.

The Crockett and Wilson soils are at the same elevation on the landscape. The Crockett soils are moderately well drained, and they have a fine sandy loam surface layer. The Wilson soils are somewhat poorly drained and have a silty clay loam or loam surface layer. They are plastic and sticky when wet. Both the Crockett and the Wilson soils are hard when dry.

The minor soils in this map unit are the well drained Altoga, Heiden, and Gowen soils; the moderately well drained Normangee, Axtell, and Houston Black soils; and the somewhat poorly drained Trinity soils.

A large part of this map unit was formerly cultivated, but most areas are now in pasture. The major limitations are erosion and droughtiness.

The soils in this map unit have medium potential for crops and pasture and high potential for range. They have low potential for urban uses because the soils have high shrink-swell characteristics, low strength, and slow percolation. Potential for recreation is medium because the soils have very slow permeability. The potential for openland wildlife habitat is high.

3. Wilson-Burleson

Nearly level to gently sloping, noncalcareous, very slowly permeable, loamy and clayey soils

The soils of this map unit are on uplands and terraces. Areas are scattered throughout the county. These soils formed in alkaline clayey sediments and marine clay.

This map unit occupies about 15 percent of the county. Wilson soils make up about 71 percent of the unit, and Burleson soils 13 percent. The remaining 16 percent is minor soils (fig. 3).

The Wilson soils have a dark gray, mildly alkaline silty clay loam surface layer about 6 inches thick. Below the surface layer to a depth of 25 inches is dark gray, mildly alkaline clay. Between depths of 25 and 39 inches is gray, mildly alkaline clay. Below this layer to a depth of 58 inches is gray, moderately alkaline clay that has light yellowish brown mottles. The underlying layer to a depth of 80 inches is light olive gray, moderately alkaline clay that has yellowish brown mottles.

The Burleson soils have a dark gray, mildly alkaline clay surface layer about 5 inches thick. Below the surface layer to a depth of 19 inches is very dark gray, mildly alkaline clay. Between depths of 19 and 37 inches is dark gray, mildly alkaline clay. Below this layer to a depth of 47 inches is dark gray, moderately alkaline clay that has grayish brown mottles. The layer below to a depth of 80 inches is light brownish gray, moderately alkaline clay that has brownish yellow mottles.

The Wilson and Burleson soils are at the same elevation on the landscape. The Wilson soils occupy the more sloping areas of the landscape. They have a silty clay loam or loam surface layer and are somewhat poorly drained. Burleson soils have a clay surface layer and they are moderately well drained. Both Wilson and the Burleson soils are very hard when dry; they are very plastic and sticky when wet.

The minor soils in this map unit are the moderately well drained Houston Black, Crockett, Normangee, and Ovan soils; the well drained Altoga soils; and the somewhat poorly drained Trinity soils.

This map unit is used mainly for pasture, but many areas are cultivated. The main limitations for farming are erosion and droughtiness.

This map unit has medium potential for cultivated crops, pasture, and range. It has low potential for urban uses because the soils have wetness, high shrink-swell properties, slow percolation, corrosivity to uncoated steel, and low strength. Potential for recreation is low because the soils are too clayey, very slowly permeable, and subject to wetness. This unit has medium potential for openland wildlife habitat.

4. Austin-Altoga

Gently sloping to strongly sloping, calcareous, moderately permeable to moderately slowly permeable, clayey soils

The soils of this map unit are on uplands in the northwest corner of the county. These soils formed in chalk and interbedded marl and in calcareous, clayey sediment.

This map unit occupies about 1 percent of the county. Austin soils make up about 66 percent of the unit, and Altoga soils make up about 18 percent. The remaining 16 percent is minor soils.

The Austin soils have a dark grayish brown, moderately alkaline silty clay surface layer about 17 inches thick. Below the surface layer to a depth of 29 inches is brown, moderately alkaline silty clay. This clay contains platy fragments of chalky limestone that increase in amount with depth. The underlying material is white, platy, chalky limestone.

The Altoga soils have a pale brown, moderately alkaline silty clay surface layer about 5 inches thick. Between depths of 5 and 25 inches is very pale brown, moderately alkaline silty clay. Between depths of 25 and 40 inches is very pale brown, moderately alkaline silty clay. The underlying layer to a depth of 80 inches is very pale brown, moderately alkaline silty clay that has light brownish gray mottles.

The Austin soils are on high, broad ridges and convex knolls, and the Altoga soils are on side slopes and steeper sloping parts of the landscape. Both the Austin and Altoga soils have a silty clay surface layer and are well drained. They are plastic and sticky when wet and become slightly hard when dry.

The minor soils in this map unit are the well drained Stephen and Eddy soils.

This map unit is used about equally for cultivated crops and pasture. A few areas, however, are planted to small grain. The major limitations are slope, depth to bedrock, droughtiness, and the hazard of water erosion.

The potential for cultivated crops is medium. The potential for pasture and range is high.

The soils in this map unit have low potential for urban uses because of slow percolation, shrink-swell characteristics, and high corrosivity to uncoated steel. The potential for recreation is low because the surface layer is too clayey. The soils have medium potential for openland wildlife habitat.

Deep, clayey and loamy soils on flood plains

The soils in this group make up about 17 percent of the county. The major soils are in the Ships, Weswood, Trinity, Gowen, and Ovan series. These are nearly level soils on bottom land and flood plains along the Brazos River and other major streams. The soils are loamy or clayey throughout the profile. These soils are somewhat poorly drained to well drained, and they are very slowly permeable to moderately permeable.

The soils on the higher part of the flood plain, or in protected areas, are used mainly for cropland. The soils subject to frequent flooding are used for pasture. Improved bermudagrass and kleingrass are the principal improved pasture grasses. Native plants are indiangrass, big bluestem, little bluestem, switchgrass, and an overstory of scattered oak, pecan, hackberry, elm, and cottonwood trees.

The soils in this group have low potential for urban and recreational uses because of flooding, wetness, low strength, slow percolation, and high shrink-swell potential. These soils have high potential for openland wildlife habitat.

5. Ships-Weswood

Nearly level, calcareous, moderately permeable to very slowly permeable, clayey and loamy soils

The soils of this map unit are along the Brazos River. These soils formed in stratified clayey and loamy calcareous alluvial sediment.

This map unit occupies about 12 percent of the county. Ships soils make up about 40 percent of the unit, and Weswood soils make up about 27 percent. The remaining 33 percent is minor soils (fig. 4).

The Ships soils have a reddish brown, moderately alkaline clay surface about 34 inches thick. The subsoil to a depth of 54 inches is red, moderately alkaline clay. The underlying layer to a depth of 80 inches is reddish brown, moderately alkaline clay.

The Weswood soils have a reddish brown, moderately alkaline silty clay loam surface layer about 6 inches thick. The subsoil to a depth of 18 inches is reddish brown, moderately alkaline silty clay loam. Between depths of 18 and 38 inches is stratified, reddish brown silty clay loam and yellowish red clay loam. The underlying layer to a depth of 60 inches is reddish brown, moderately alkaline silty clay loam that has thin layers of very fine sandy loam and silt loam.

Ships and Weswood soils are at the same elevation on the flood plain. Ships soils generally are along the outer edge of the flood plain. They have a clayey surface layer, and they are moderately well drained. Weswood soils have a silty clay loam, or silt loam surface layer and they are well drained. These soils are subject to flooding once a year to once in ten years. The flooding lasts from several hours to several days.

The minor soils in this map unit are the well drained Yahola and Highbank soils; the somewhat excessively drained Gaddy soils; and the somewhat poorly drained to poorly drained Roetex soils.

This map unit is used for both cropland and pasture. Soil wetness and flooding on the lower part of the flood plain are the major limitations to use of these soils for farming.

This map unit has high potential for crops, range, and pasture. The potential for urban use is low because of flooding, wetness, low strength, slow percolation, and the shrink-swell potential. Potential for recreation is low because of the clayey surface layer and the flooding. This unit has high potential for openland wildlife habitat.

6. Gowen-Trinity

Nearly level, noncalcareous and calcareous, moderately permeable to very slowly permeable, clayey and loamy soils

The soils of this map unit are on flood plains along major streams in the eastern half of the county. These soils formed in calcareous clayey and noncalcareous loamy alluvium that washed from the surrounding uplands.

This map unit occupies 3 percent of the county. Gowen soils make up about 57 percent of the unit, and Trinity soils make up about 37 percent. The remaining 6 percent is minor soils.

The Gowen soils have a surface layer of very dark grayish brown, neutral clay loam about 23 inches thick. Below the surface layer to a depth of 36 inches is brown, neutral clay loam. The underlying layer to a depth of 80 inches is dark grayish brown, neutral clay loam that is stratified with fine sandy loam and clay in the lower part.

The Trinity soils have a dark gray, moderately alkaline clay surface layer about 47 inches thick. Between depths of 47 and 67 inches is gray, moderately alkaline clay. The underlying layer to a depth of 80 inches is olive gray, moderately alkaline clay.

The Gowen and Trinity soils are at the same level on the flood plains. Gowen soils are on flood plains that drain loamy uplands, and Trinity soils are on flood plains that drain clayey uplands. Gowen soils have a clay loam surface layer and are well drained; Trinity soils have a clay surface layer and are somewhat poorly drained. Both the Gowen and Trinity soils are subject to flooding once a year to once in 10 years; flooding lasts from several hours to several days.

The minor soils in this map unit are the somewhat poorly drained Wilson soils, the well drained Bunyan and

Heiden soils, and the moderately well drained Burleson soils.

This map unit is used for pasture and cropland. (The occasionally flooded and protected areas are used for cropland.) Flooding is the main limitation for farming.

The potential for cultivated crops is medium, and the potential for range and improved grass pasture is high. The potential for urban uses is low because of flooding, shrink-swell potential, and wetness. The potential for recreation is low because of flooding. Also, Trinity soils are limited for recreation by a surface layer that is too clayey for this use and by their very slow permeability. Both the Gowen and Trinity soils have medium potential for openland wildlife habitat.

7. Ovan-Trinity

Nearly level, calcareous, very slowly permeable, clayey soils

The soils of this map unit are on flood plains along major streams in the western half of the county. These soils formed in calcareous clayey sediment that washed from the surrounding uplands.

This map unit occupies 2 percent of the county. Ovan soils make up about 58 percent of the unit, and Trinity soils make up about 32 percent. The remaining 10 percent is minor soils.

The Ovan soils have a surface layer of dark grayish brown, moderately alkaline silty clay about 46 inches thick. The underlying layer to a depth of 80 inches is grayish brown, moderately alkaline silty clay.

The Trinity soils have a dark gray, moderately alkaline clay surface layer about 47 inches thick. Between depths of 47 and 67 inches is gray, moderately alkaline clay. The underlying layer to a depth of 80 inches is olive gray, moderately alkaline clay.

The Ovan and Trinity soils are at the same elevation on the flood plains. The Ovan soils have a silty clay surface layer, and they are moderately well drained. The Trinity soils have a clay surface layer, and they are somewhat poorly drained. These soils are subject to flooding once a year to once every 10 years; flooding lasts from several hours to several days.

The minor soils in this map unit are the well drained Ferris soils, the moderately well drained Burleson soils, and the somewhat poorly drained Wilson soils.

Most of this map unit is used for pasture. Crops are grown on occasionally flooded and protected parts of the flood plains. Flooding and wetness are the major limitations.

The potential for growing crops is medium. Potential for range and improved grass pasture is high. The potential for urban uses is low because of flooding, wetness, and shrink-swell potential. Potential for recreation is low because of the clayey surface layer, flooding, and very slow permeability. This unit has medium potential for openland wildlife habitat.

Deep, sandy and loamy soils on uplands and high stream terraces

The soils in this group makes up about 12 percent of the county. The major soils are in the Axtell, Silawa, Tabor, Silstid, and Padina series. They are nearly level to sloping and are on uplands and high stream terraces. The soils have a sandy and loamy surface layer and a loamy and clayey underlying layer. These soils are moderately well drained to well drained, and they are very slowly permeable to moderately permeable.

Most of the soils were cultivated at one time but are now in native pasture. The only crops now grown are corn and a few such specialty crops as tomatoes and watermelons. The principal improved pasture grasses are weeping lovegrass, kleingrass, and improved bermudagrass. Native plants are little bluestem, purpletop, indiangrass, sideoats grama, and scattered post oak, and blackjack oak.

Most of soils have low potential for urban uses. They are limited by high shrink-swell characteristics, low strength, and slow percolation. The soils have medium potential for recreational uses because of slow percolation and blowing of sand. They have medium potential for wildlife habitat.

8. Silawa-Axtell

Nearly level to sloping, noncalcareous, moderately permeable to very slowly permeable, loamy soils

The soils of this map unit are on high stream terraces along the western side of the Brazos River. These soils formed in clayey and loamy sediment and alkaline marine clays and material weathered from shales.

This map unit occupies about 9 percent of the county Silawa soils make up about 38 percent of the unit, and Axtell soils make up about 18 percent. The remaining 44 percent is minor soils (fig. 5).

The Silawa soils have a slightly acid fine sandy loam surface layer about 13 inches thick. It is pale brown in the upper part and light yellowish brown below a depth of 6 inches. Between depths of 13 and 38 inches is red, medium acid sandy clay loam. Between depths of 38 and 59 inches is red, medium acid fine sandy loam. The underlying layer to a depth of 70 inches is red, medium acid loamy fine sand.

The Axtell soils have a slightly acid, fine sandy loam surface layer about 9 inches thick. It is dark brown in the upper part and brown below a depth of 4 inches. Below this layer to a depth of 19 inches is brown, strongly acid clay that has light brownish gray, red, and light yellowish brown mottles. Between depths of 19 and 34 inches is brownish yellow, slightly acid clay that has light brownish gray mottles. Between depths of 34 and 50 inches is brownish yellow, moderately alkaline sandy clay loam that has light gray, yellow, and yellowish red mottles. The underlying layer to a depth of 80 inches is brownish yellow, moderately alkaline sandy clay loam that has very pale brown, yellow, and yellowish red mottles.

The Silawa and Axtell soils are at about the same elevation on the landscape. The Silawa soils are on the steeper parts. Silawa soils have a fine sandy loam or loamy fine sand surface layer. They are well drained. The Axtell soils have a fine sandy loam surface layer. They are moderately well drained.

The minor soils in this map unit are the well drained Silstid and Gowen soils, the moderately well drained Chazos and Padina soils, and the somewhat excessively drained Desan soils.

A large part of this map unit was formerly cultivated, but most areas are now in unimproved pasture. Water erosion and droughtiness are the major limitations for farming.

The potential for cultivated crops is medium; the potential for range and improved pasture is high. The potential for urban uses is low because of high shrink-swell potential, slow percolation, and low strength. The potential for recreation is high. This unit has high potential for openland wildlife habitat.

9. Axtell-Tabor

Nearly level to sloping, noncalcareous, very slowly permeable, loamy soils

The soils in this map unit are on uplands and high stream terraces in the southeast corner of the county. These soils formed in acid to alkaline clays and sandy clays that are interbedded with sandier materials.

This map unit occupies about 2 percent of the county. Axtell soils make up about 43 percent of the unit, and Tabor soils make up about 16 percent. The remaining 41 percent is minor soils.

The Axtell soils have a slightly acid fine sandy loam surface layer about 9 inches thick. It is dark brown in the upper part and brown below a depth of 4 inches. Below this layer to a depth of 19 inches is brown, strongly acid clay that has light brownish gray, red, and light yellowish brown mottles. Between depths of 19 and 34 inches is brownish yellow, slightly acid clay that has light brownish gray mottles. Between depths of 34 and 50 inches is brownish yellow, moderately alkaline sandy clay loam that has light gray, yellow, and yellowish red mottles. The underlying layer to a depth of 80 inches is brownish yellow, moderately alkaline sandy clay loam that has very pale brown, yellow, and yellowish red mottles.

The Tabor soils have a fine sandy loam surface layer about 12 inches thick. This layer is brown and slightly acid in the upper part and pale brown and strongly acid below a depth of 7 inches. Between depths of 12 and 28 inches is brown, strongly acid clay that has grayish brown, brownish yellow, and reddish yellow mottles. Between depths of 28 and 44 inches is yellowish brown, strongly acid clay that has light brownish gray, brownish yellow, brown, and yellowish red mottles. Between depths of 44 and 54 inches is light gray, mildly alkaline clay that has yellowish red, reddish yellow, brown, and red mottles. The underlying layer to a depth of 70 inches is mildly alkaline clay that is mottled brownish yellow, light brownish gray, and yellowish red.

The Axtell and Tabor soils are at about the same level in the landscape. Axtell soils are also in the more steeply sloping areas of the landscape. Both the Axtell and the Tabor soils have a fine sandy loam surface layer and are moderately well drained.

The minor soils in this map unit are the well drained Silawa soils; the moderately well drained Normangee, Chazos, and Crockett soils; and the somewhat excessively drained Desan soils.

This map unit was formerly cultivated, but most areas are now in pasture and abandoned fields. Water erosion and droughtiness are the major restrictions to farming.

The potential for cultivated crops is medium, and the potential for range and pasture is high. The soils in this map unit have low potential for urban land uses because of high shrink-swell potential, low strength, and slow percolation. The potential for recreation is medium because of very slow permeability. The potential for openland wildlife habitat is medium.

10. Silstid-Padina

Nearly level to gently sloping, noncalcareous, moderately permeable to moderately slowly permeable, sandy soils

The soils in this map unit are on uplands in the southeast corner of the county. These soils formed in residuum weathered from beds of sandy or loamy material.

This map unit occupies about 1 percent of the county. Silstid soils make up about 51 percent of the unit, and Padina soils make up about 28 percent. The remaining 21 percent is minor soils.

The Silstid soils have a slightly acid, loamy fine sand surface layer about 26 inches thick. It is brown in the upper part and pale brown below a depth of 10 inches. Between depths of 26 and 43 inches is brownish yellow, medium acid sandy clay loam that has pale brown and reddish yellow mottles. Between depths of 43 and 56 inches is yellow, medium acid sandy clay loam that has light gray and reddish yellow mottles. The underlying layer to a depth of 80 inches is brownish yellow, medium acid sandy clay loam that has reddish yellow mottles.

The Padina soils have a surface layer of medium acid fine sand about 49 inches thick. This layer is pale brown in the upper part and very pale brown below a depth of 8 inches. Between depths of 49 and 65 inches is very pale brown, strongly acid sandy clay loam that has strong brown and light gray mottles. The underlying layer to a depth of 80 inches is white, strongly acid sandy clay loam that has reddish yellow and red mottles.

The Silstid and Padina soils occupy about the same elevation on the landscape. The Silstid soils are well drained and have a loamy fine sand surface layer. The Padina soils are moderately well drained and have a fine sand surface layer. Both the Silstid and Padina soils are loose when dry and subject to soil blowing in unprotected areas.

The minor soils in this map unit are the well drained Silawa soils and the moderately well drained Chazos and Axtell soils.

Some areas of this unit that were formerly cultivated are now abandoned fields. A large part of the unit is in native postoak and blackjack timberland. The soils of this unit have low potential for cultivated crops. The major limitations for farming are droughtiness and the soil blowing hazard.

The soils in this map unit have low potential for cultivated crops and range and medium potential for pasture. The potential for urban development is high, and any existing limitations can be easily overcome. The potential for recreation is low because the soils are too sandy. The soils have low potential for openland wildlife habitat because of a lack of water.

Land-use considerations

The soils in Falls County vary widely in their potential for major land uses.

Table 2 gives general ratings of the potential of each map unit of the general soil map for major land uses. Kinds of soil limitations are also indicated in general terms. The ratings of soil potential reflect the relative cost of such practices and also the hazard of soil-related problems continuing after such practices are used. The ratings do not consider location in relation to existing transportation systems or other kinds of facilities.

Each map unit is rated for cultivated farm crops, pasture, range, urban uses, recreation, and openland wildlife. Cultivated farm crops grown in the survey area include cotton, grain sorghum, and small grain. Pasture refers to land used for growing grasses of improved species, such as kleingrass, weeping lovegrass, and improved bermudagrass. Range refers to land in native range plants. Urban uses include residential, commercial, and industrial sites. Recreation includes playgrounds, nature study areas, paths and trails, campsites, and picnic areas. Openland wildlife refers to areas that supply water, cover, and food for those wildlife that do not require heavy cover in their habitat.

Generally the kind of soil, the amount of rainfall, and lack of water are the most important factors that influence land use in Falls County.

Presently about 61 percent of the county is used for crops. As shown in table 2, about 45 percent of the county has high potential for this use, about 54 percent has medium potential, and 1 percent has low potential.

About 23 percent of the county is used for pasture, but about 62 percent of it has high potential for this use, and 38 percent has medium potential. Only 5 percent of the county is used for range, although about 84 percent has high potential, 15 percent has medium potential, and only 1 percent has low potential.

In recent years there has been a slight decrease in the number of acres used for crops and a slight increase in the number of acres used for pasture. Also, there has been a slight increase in the number of acres used for specialty crops, urban development, and recreation.

In general the Houston Black-Heiden and Ships-Weswood units have high potential for cultivated farm crops. The soils are deep and clayey and loamy and are well suited to cultivation. The Houston Black-Heiden soils, however, require good management to prevent water erosion. The Ships-Weswood soils in the lower areas near the river are flooded at times.

Most of the soils of the county have high potential for pasture. The only exceptions are the soils of the Crockett-Wilson, Wilson-Burleson, and Silstid-Padina units. The soils in these units are droughty during the summer months, and as a result the amount of forage production is reduced.

Most of the soils of the county have a high or medium potential for range. The only exceptions are the soils of the Silstid-Padina map unit.

The only soils in the county that have high potential for urban uses are those in the Silstid-Padina map unit. Soils in the other units are limited by high shrink-swell potential, low strength, or slow percolation. Soils of the Ships-Weswood, Gowen-Trinity, and Ovan-Trinity map units also have a hazard of flooding. With the exception of the hazard of flooding, limitations can be overcome by proper design and installation procedures.

The soils in the Silawa-Axtell map unit are the only ones in the county that have a high potential for recreation. Crockett-Wilson, Ships-Weswood, and Silawa-Axtell soils have high potential for openland wildlife habitat.

The general soils information in this section and more detailed information in the following sections can be used as a guide in planning orderly growth and development of the county. This information is especially helpful in determining which lands to allocate to each use.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils

for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series.* Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Bastrop series, for example, was named for the town of Bastrop in Texas.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Houston Black clay, 0 to 1 percent slopes, is one of several phases within the Houston Black series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Ferris-Heiden complex, 5 to 12 percent slopes, severely eroded, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Axtell and Crockett soils, 2 to 8 percent soils, severely eroded, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 3, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions and potentials

1—Aledo soils, 1 to 5 percent slopes. This unit consists of shallow, well drained, gently sloping soils on uplands. Slopes are convex. Areas are long narrow bands that range from 5 to 100 acres in size.

These soils are not uniform and do not occur in a regular pattern. Surface texture varies, but in some pedons it is fine sandy loam or loam. In some pedons the surface layer is gravelly or cobbly and in others this layer has mixed textures.

A typical map unit is about 50 percent Aledo soils that have a fine sandy loam surface layer; 40 percent Aledo soils that have a loam surface layer; and 10 percent Crockett, Wilson, and Altoga soils. The Crockett and Wilson soils are in gently sloping parts of the landscape at the same elevation, and the Altoga soils are in sloping parts below the Aledo soils.

Typically, the surface layer is dark grayish brown, moderately alkaline fine sandy loam about 5 inches thick. It is about 10 percent limestone pebbles. The next layer, to a depth of 10 inches, is dark grayish brown, moderately alkaline very gravelly fine sandy loam and is about 60 percent limestone fragments. The underlying material is indurated limestone.

The soils are worked throughout a wide range of moisture conditions, but gravelly spots restrict proper tillage. Permeability is moderate, and the available water capacity is very low. Runoff is medium, and the hazard of water erosion is moderate. The high content of lime causes iron chlorosis in sensitive plants.

These soils are used primarily for unimproved pasture. They have low potential for crops, range, pasture, and wildlife habitat. Limitations for these uses are very low available water capacity and a restricted root zone.

These soils have low potential for urban use because of the shallow depth to rock. They have medium potential for recreation. Stones on the surface and depth to rock are the most restrictive limitations for the latter use. Capability subclass VIs; Shallow range site.

2—Altoga silty clay, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on broad ridgetops of the uplands. Slopes are convex. Most areas are 10 to 40 acres in size.

This soil has a surface layer of grayish brown, moderately alkaline silty clay about 7 inches thick. Below the surface layer, to a depth of 24 inches, is light brownish gray, moderately alkaline silty clay. Between depths of 24 and 42 inches is light brownish gray, moderately alkaline silty clay that has brownish yellow mottles. The underlying layer, to a depth of 80 inches, is light gray, moderately alkaline silty clay that has brownish yellow mottles.

This soil is easily worked throughout a wide range of moisture conditions. Permeability is moderate, and the available water capacity is high. Roots easily penetrate the deep root zone. Runoff is medium. The hazard of water erosion is moderate. The content of lime is high, and as a result iron chlorosis occurs in sensitive plants.

Included with this soil in mapping are a few intermingled areas of Houston Black, Heiden, and Lewisville soils. The included soils make up about 5 to 10 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by low natural fertility. The main crops are cotton and grain sorghum, but small grain is also grown. The major objectives of management are controlling erosion and improving tilth. Terracing and growing high-residue crops help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and weeping lovegrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of scattered elm, hackberry, and oak trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, slow percolation, and high corrosivity to uncoated steel. Potential for recreation is medium. The clayey surface layer is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Clay Loam range site.

3—Altoga soils, 3 to 5 percent slopes, eroded. This map unit consists of deep, well drained, gently sloping soils on uplands. Texture of the surface layer varies in an irregular pattern from silty clay to clay loam. In places water erosion has removed the original surface layer, and many areas are dissected by shallow gullies about 100 feet apart. Slopes are convex. Most areas are about 40 acres in size.

A typical unit is about 53 percent Altoga silty clay loam; 37 percent Altoga clay loam; and 10 percent Austin, Heiden, and Lewisville soils. Austin and Heiden soils are in less sloping parts of the landscape, and Lewisville soils are intermingled with them.

Typically, these soils have a surface layer of light yellowish brown, moderately alkaline silty clay about 6 inches thick. Between depths of 6 and 40 inches is moderately alkaline silty clay that is light yellowish brown above 20 inches and very pale brown below. Soft bodies of calcium carbonate are throughout this layer. The underlying layer, to a depth of 80 inches, is light yellowish brown, moderately alkaline silty clay that has brownish yellow mottles.

These soils are easy to work throughout a wide range of moisture conditions. When dry, they are hard and will clod when plowed. Permeability is moderate, and available water capacity is high. Roots easily penetrate the deep root zone. Runoff is medium, and the hazard of water erosion is moderately severe. The lime content is high, and as a result iron chlorosis occurs in sensitive plants.

These soils have medium potential for crops. Low natural fertility is a limitation to use. The main crops are grain sorghum and small grain. The major objectives of management are controlling erosion and improving fertility and tilth. Growing high-residue crops and terracing help control erosion and maintain soil tilth.

The potential for pasture is high. Such improved grasses as bermudagrass, kleingrass, and weeping lovegrass are well suited to this soil. Fertilization, weed control, and controlled grazing are management practices that are needed to produce good yields.

These soils have high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of scattered elm, hackberry, and oak trees.

These soils have low potential for most urban uses. The most restricted limitations are shrinking and swelling with changes in moisture, slow percolation, and high corrosivity to uncoated steel. Potential for recreation is medium. The clayey surface layer is the most restrictive limitation. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Clay Loam range site.

4—Altoga soils, 5 to 12 percent slopes, eroded. This map unit consists of deep, well drained, sloping to strongly sloping soils on uplands. Texture of the surface layer varies in an irregular pattern from silty clay to clay loam. Most areas of this map unit have shallow gullies 100 to 200 feet apart. These gullies can be crossed by farm machinery. Slopes are convex. Most areas are about 30 acres in size.

A typical area of this map unit is about 50 percent Altoga silty clay loam; 40 percent Altoga clay loam; and 10 percent Austin, Heiden, and Lewisville soils. Austin and Heiden soils are on less sloping parts of the landscape, and Lewisville soils are intermingled with them.

Typically, these soils have a surface layer of pale brown, moderately alkaline silty clay about 5 inches thick. Below the surface layer, to a depth of 25 inches, is very pale brown, moderately alkaline silty clay. Between depths of 25 and 40 inches is very pale brown, moderately alkaline silty clay. The underlying layer, to a depth of 80 inches, is very pale brown, moderately alkaline silty clay that has light brownish gray mottles.

The soils can be worked throughout a wide range of moisture conditions, but hard clods result if they are plowed when dry. Permeability is moderate, and available water capacity is high. Tilth is generally good. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of erosion is severe. The high content of lime causes iron chlorosis in sensitive plants.

These soils have low potential for crops and pasture. Their main limitations for these uses are slope and the problem of controlling erosion. Potential for range is high. The climax plant community is a mixture of tall and mid grasses and an overstory of scattered elm, hackberry, and oak trees.

Potential of these soils for urban use is low. These soils are limited for this use by shrinking and swelling with changes in moisture, slope, and corrosivity to uncoated steel. Potential for recreation is medium because of the clayey surface layer and slope. Potential for both openland rangeland wildlife habitat is medium. Capability subclass VIe; Clay Loam range site.

5—Austin silty clay, 1 to 3 percent slopes. This moderately deep, well drained, gently sloping soil is on high ridges and convex knolls on uplands. Most areas are broad, but some are long and narrow. Individual areas range from 25 to 100 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 17 inches thick. Below the surface layer, to a depth of 29 inches, is brown, moderately alkaline silty clay and platy fragments of chalky limestone that increase in amount in the lower part. The underlying material is white, platy, chalky limestone.

This soil has good tilth and can be easily worked. When plowed, the soil crumbles and forms good seedbeds. Permeability is moderately slow, and available water capacity is low. The root zone is moderately deep, and it is easily penetrated by roots. Runoff is medium, and the hazard of water erosion is moderate. The content of lime is high, and as a result iron chlorosis occurs in sensitive plants.

Included with this soil in mapping are small areas of Altoga, Eddy, Stephen, and Houston Black soils. The Eddy and Stephen soils are on shallow side slopes and ridgetops. Altoga soils are on side slopes. Narrow areas of Houston Black are along drainageways. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for row crops, but it is limited for this use by low available water capacity and moderate depth to rock. The major crops are grain sorghum and cotton, but small grain is also grown. Terracing and a cropping system that includes high-residue crops help control erosion and maintain soil tilth.

This soil has high potential for pasture. It is suited to improved bermudagrass, kleingrass, and weeping lovegrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses; hackberry, elm, and pecan trees along drainageways; and scattered oak trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, slow percolation, and depth to rock. Potential for recreation is medium. The clayey surface layer is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Clay Loam range site.

6—Austin silty clay, 3 to 5 percent slopes, eroded. This moderately deep, well drained, gently sloping soil is on uplands. Areas are long and narrow. Most areas are dissected by shallow gullies that are 1 to 2 feet deep and about 100 feet apart. Slopes are convex. Individual areas range from 10 to 50 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 8 inches thick. The subsoil is brown, moderately alkaline silty clay to a depth of 24 inches and is about 30 percent platy fragments of chalky limestone in the lower part. The soil is underlain by white, platy, chalky limestone.

This soil has good tilth and can be worked throughout a wide range of moisture conditions. Permeability is moderately slow, and the available water capacity is low. Roots easily penetrate the moderately deep root zone. Runoff is medium. The hazard of water erosion is moderately severe.

Included with this soil in mapping are intermingled areas of Eddy, Stephen, and Altoga soils. Narrow bands of Houston Black soils are included along some drainageways. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for row crops, but it is limited for this use by the low available water capacity and moderate depth to rock. It is used mainly for grain sorghum and small grain, but corn and cotton are also grown. The major objective in management is controlling erosion. Terraces with suited vegetation are needed to help control runoff.

This soil has high potential for pasture. It is suited to King Ranch bluestem, kleingrass, weeping lovegrass, and improved bermudagrass. Necessary management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of hackberry, elm, and pecan trees along drainageways, and scattered oak trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, slow percolation, and depth to rock. Potential for recreation is medium. The clayey surface layer is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IVe; Clay Loam range site.

7—Axtell fine sandy loam, 0 to 1 percent slopes. This deep, moderately well drained nearly level soil is on uplands and ancient terraces. Slopes are plane to slightly convex. Areas range from 5 to 70 acres in size.

This soil has a surface layer of medium acid fine sandy loam about 9 inches thick. The upper part, to a depth of 4 inches, is brown, and the lower part is pale brown. Between depths of 9 and 19 inches is reddish brown, strongly acid clay that has light brownish gray mottles. Below this layer, to a depth of 34 inches, is light reddish brown, medium acid clay that has red and grayish brown mottles. Between depths of 34 and 55 inches is reddish brown, moderately alkaline clay that has yellowish brown, light gray, and grayish brown mottles. The underlying layer, to a depth of 80 inches, is light yellowish brown, moderately alkaline clay that has yellowish brown and light gray mottles.

The surface layer is easy to work. Permeability is very slow. The available water capacity is high, but the lower layers receive and release water slowly. The root zone is deep, but penetration by plant roots is slow and difficult in the underlying layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small intermingled areas of Silawa and Tabor soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for crops. In many areas are abandoned fields that are now overgrown with mesquite trees (fig. 6). Droughtiness and low natural fertility are limitations for crops. The principal crops are grain sorghum, small grain, and corn, but such specialty crops as tomatoes and watermelons are also grown. The major objectives of management are improving soil tilth and improving fertility. Large additions of organic matter are needed to reduce surface crusting and improve tilth. Crops that produce large amounts of residue help maintain soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and weeping lovegrass. Proper management includes fertilizing with nitrogen, phosphorus, and potassium; weed control; and controlled grazing.

This soil has low potential for range because of droughtiness.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation. The potential for recreation is medium. The very slow permeability is the most restrictive limitation for this use. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is high. Capability subclass IIIs; Claypan Savannah range site.

8—Axtell fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands and ancient stream terraces. Slopes are convex, and areas average about 50 acres in size.

This soil has a surface layer of dark brown and brown, slightly acid fine sandy loam about 9 inches thick. Below this layer, to a depth of 19 inches, is brown, strongly acid clay that has light brownish gray, red, and light yellowish brown mottles. Between depths of 19 and 34 inches is brownish yellow, slightly acid clay that has light brownish gray mottles. Between depths of 34 and 50 inches is brownish yellow, moderately alkaline sandy clay loam that has light gray, yellow, and yellowish red mottles. The underlying layer, to a depth of 80 inches, is brownish yellow, moderately alkaline sandy clay loam that has very pale brown, yellow, and yellowish red mottles.

The surface layer is easily worked, but in places large clods of the underlying layer are plowed up. The permeability is very slow. The available water capacity is high, but the lower layers receive and release water slowly. The root zone is deep, but plant roots have difficulty in penetrating the lower layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are small intermingled areas of Silawa and Tabor soils. The included soils make up 10 to 20 percent of the map unit.

This soil has medium potential for crops, but it is limited by low natural fertility and droughtiness. The main crops are corn and small grain, but some grain sorghum is also grown. Some areas are used to grow such specialty crops as tomatoes and watermelons. The major objectives in management are controlling erosion and improving soil tilth and fertility. Terracing and use of high-residue crops help control erosion and maintain soil tilth.

This soil has high potential for pasture. It is suited to improved bermudagrass, kleingrass, and weeping lovegrass. Fertilizing with nitrogen, phosphorus, and potassium; weed control; and controlled grazing are needed for high production of grass.

This soil has low potential for range. It is limited for this use by droughtiness.

This soil has low potential for most urban uses. Shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation are its most restrictive limitations. Potential for recreation is medium. The very slow permeability is the most restrictive limitation for this use. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is high. Capability subclass IIIe; Claypan Savannah range site.

9—Axtell fine sandy loam, 2 to 5 percent slopes, eroded. This deep, moderately well drained, gently sloping soil is on uplands and ancient stream terraces. Part of the original surface layer has been removed by erosion. Shallow gullies, 1 to 2 feet deep, occur at intervals of 200 to 500 feet. Slopes are convex, and average about 20 to 30 acres in size.

This soil has a surface layer of brown, medium acid fine sandy loam about 6 inches thick. Below the surface layer, to a depth of 24 inches, is yellowish red, strongly acid clay that has grayish brown and yellowish brown mottles. Between depths of 24 and 48 inches is brown, medium acid clay that has dark grayish brown, dark yellowish brown, and yellowish red mottles. Between depths of 48 and 59 inches is light yellowish brown, moderately alkaline sandy clay loam that has light gray, strong brown, and yellowish red mottles. The underlying layer, to a depth of 63 inches, is very pale brown, moderately alkaline sandy clay loam that has yellowish brown, brownish yellow, and strong brown mottles.

The surface layer is easily worked, but the underlying layers are difficult to work.

Permeability is very slow. The available water capacity is high, but the lower layers receive and release water slowly. The root zone is deep, but root development is slow in the underlying layer. Runoff is rapid. The hazard of water erosion is moderately severe.

Included with this soil in mapping are small intermingled areas of Silawa and Tabor soils. The included soils make up 10 to 20 percent of this map unit.

This soil has low potential for crops and range, but it is limited because of the size of areas, slope, and loss of the surface layer by erosion. Terracing and planting crops that produce large amounts of residue help to control erosion and maintain soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and weeping lovegrass. Fertilization with nitrogen, phosphorus, and potassium; weed control; and controlled grazing are needed for high production of grass.

This soil has low potential for most urban uses. Shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation are the most restrictive limitations. Potential for recreation is medium. The very slow permeability is the most restrictive limitation. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is high. Capability subclass IVe; Claypan Savannah range site.

10—Axtell and Crockett soils, 2 to 8 percent slopes, severely eroded. This map unit consists of deep, moderately well drained gently sloping to sloping Axtell and Crockett soils on uplands. These soils are not uniform and occur in an irregular pattern. Most mapped areas contain both soils, but in a few areas one or the other of these soils is not present. The soils have been severely damaged by water erosion. Areas have numerous deep gullies, and sheet erosion is common between gullies (fig. 7). Slopes are convex. The areas are mostly about 25 acres in size.

A typical area of this map unit is about 38 percent Axtell soils; 35 percent soils similar to Axtell and Crockett soils except that the surface layer and part of the subsoil have been removed by erosion; and 27 percent Crockett soils. The soils that are similar to Axtell and Crockett soils have a clayey surface layer and are in gullies. Axtell and Crockett soils occupy areas between gullies.

Typically, the Axtell soils have a pale brown, slightly acid fine sandy loam surface layer that is about 3 inches thick. Below the surface layer, to a depth of 27 inches, is reddish brown, strongly acid clay that has dark grayish brown, dark brown, and red mottles. Between depths of 27 and 39 inches is brown, slightly acid clay that has yellowish brown, brownish yellow, and dark grayish brown mottles. Between depths of 39 and 54 inches is brownish yellow, mildly alkaline clay loam that has brown and light gray mottles. The underlying layer, to a depth of 75 inches, is yellow, mildly alkaline sandy clay loam that has very pale brown and light gray mottles.

The Crockett soils have a brown, slightly acid fine sandy loam surface layer that is about 4 inches thick. Below the surface layer, to a depth of 11 inches, is reddish brown and brown, slightly acid clay that has grayish brown and dark grayish brown mottles. Between depths of 11 and 34 inches is light yellowish brown, slightly acid clay that has grayish brown, yellowish brown, and strong brown mottles. Between depths of 34 and 44 inches is brown, moderately alkaline clay that has grayish brown, yellowish brown, and brown mottles. The underlying layer, to a depth of 71 inches, is brownish yellow, moderately alkaline sandy clay loam that has light gray, strong brown, and yellowish brown mottles.

The soils are droughty because they receive water slowly and release it slowly to plants. They are very slowly permeable and have a high available water capacity. The root zone is deep. Runoff is rapid, and the hazard of water erosion is severe.

These soils have low potential for crops, pasture, recreation, and urban uses. They are limited by deep gullies. Costly filling of gullies and shaping of land is required before these areas are suitable for use. Other restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, slow percolation, and slope.

These soils have low potential for range. They are limited because the surface layer has been eroded away. Forage yields are low. The climax plant community is tall and mid grasses and an overstory of a few scattered live oak, elm, and hackberry trees.

These soils have medium potential for openland wildlife habitat and high potential for rangeland wildlife habitat. Capability subclass VIe; Axtell part in Claypan Savannah range site, Crockett part in Claypan Prairie range site.

11—Bastrop fine sandy loam. This deep, well drained, nearly level soil is on low terraces just above the flood plain of the Brazos River. Slopes are convex and range from 0 to 1 percent. Areas are oval in shape and range from 15 to 75 acres in size.

This soil has a surface layer of brown, medium acid fine sandy loam about 11 inches thick. Between depths of 11 and 15 inches is reddish brown, slightly acid sandy clay loam. Between depths of 15 and 51 inches is yellowish red, slightly acid sandy clay loam. Below this layer, to a depth of 67 inches, is red, slightly acid gravelly sandy clay loam. Between depths of 67 and 75 inches is red, slightly acid very gravelly sandy clay loam. Between depths of 75 and 80 inches is red, slightly acid very gravelly loamy fine sand.

This soil has good tilth and can be worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is high. Roots penetrate the deep root zone. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Silstid, Silawa, and Weswood soils. The Silawa and Silstid soils are on terraces of higher elevation, and the Weswood soils are on the flood plain. Included soils make up less than 20 percent of this map unit.

This soil has high potential for crops, and such specialty crops as watermelons and tomatoes are grown in some areas. The major objectives of management are maintaining soil tilth and fertility. Using a cropping system that includes cool-season legumes and growing crops that produce large amounts of residue help to maintain soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and weeping lovegrass. Proper management includes weed control, fertilization with nitrogen and phosphorus, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of mid and tall grasses and an overstory of scattered post oak and blackjack oak. This soil has high potential for most urban recreation uses. It has no limitation that cannot be easily overcome. Potential for both openland and rangeland wildlife habitat is high. Capability subclass I; Sandy Loam range site.

12—Blum Variant fine sandy loam, 1 to 3 percent slopes. This moderately deep, moderately well drained, gently sloping soil is on uplands. Slopes are smooth to slightly convex. Areas range from 60 to 500 acres in size.

This soil has a surface layer of dark brown and brown, neutral fine sandy loam about 15 inches thick. Between depths of 15 to 20 inches is mottled grayish brown, yellowish red, and brownish yellow neutral sandy clay loam. Between depths of 20 and 38 inches is mottled grayish brown, brownish yellow, and yellowish red slightly acid and neutral clay. The soil is underlain by indurated limestone.

The surface layer is easy to work under most moisture conditions. Permeability and available water capacity are low. The root zone is moderately deep. Plant roots penetrate the surface layer easily, but their development in the clayey lower layers is slow and difficult. Runoff is slow. The hazard of water erosion is moderate.

Included with this soil in mapping are intermingled areas of Crockett, Wilson, and Tabor soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for crops, but it is limited for this use by the low available water capacity and the moderate depth of the root zone. The major objectives in management are controlling erosion and improving fertility and tilth. Terracing, fertilization, and growing crops that produce large amounts of residue help control erosion and maintain soil tilth.

This soil has high potential for pasture. Most areas are used for unimproved pasture. The soil is used for improved bermudagrass, weeping lovegrass, and kleingrass. Fertilization, weed control, and controlled grazing are needed to maintain good production.

This soil has medium potential for range. The climax plant community is a mixture of mid and tall grasses and an overstory of scattered post oak and blackjack oak.

This soil has medium potential for most urban uses. The most restrictive limitations are shrinking and swelling with changes in moisture and depth to rock. The potential for recreation is medium. The slow permeability is the most restrictive limitation for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability subclass IIIe; Sandy Loam range site.

13—Branyon clay, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is on narrow terraces along major streams. Slopes are smooth. Areas range from 15 to 500 acres in size.

This soil has a surface layer of very dark gray, moderately alkaline clay about 48 inches thick. Below the surface layer, to a depth of 66 inches, is dark gray, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is grayish brown, moderately alkaline clay that has brown mottles.

This soil is sticky when wet and is difficult to work. When it is dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but penetration by plant roots is restricted by the clayey lower layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Houston Black, Heiden, and Lewisville soils. The Houston Black and Heiden soils are on uplands. The Lewisville soils are on steeper side slopes. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly for crops. The potential for this use is high. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The major objectives in management are maintaining tilth and providing adequate surface drainage. Proper management includes growing crops that produce large amounts of residue and maintaining smooth surface gradients.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along drainageways.

This soil has low potential for most urban uses. Limitations that affect urban development are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. Potential for recreation is low. The clayey surface layer and very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIw; Blackland range site.

14—Branyon clay, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on narrow terraces along major streams. Slopes are plane or slightly concave. Areas range from 10 to 150 acres in size.

This soil has a surface layer of dark gray, moderately alkaline clay about 39 inches thick. Below the surface layer, to a depth of 48 inches, is gray, moderately alkaline clay. Between depths of 48 and 61 inches is grayish brown, moderately alkaline clay that has brown mottles. The underlying layer, to a depth of 80 inches, is light brownish gray, moderately alkaline clay that has yellowish brown mottles.

This soil is sticky when wet and is difficult to work. When it is dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. The permeability is very slow, and the available water capacity is high. The root zone is deep, but penetration by plant roots is restricted by the clayey lower layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Houston Black, Heiden, and Lewisville soils. Houston Black and Heiden soils are on uplands, and Lewisville soils are on steeper side slopes. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly for crops. The potential for this use is high. Cotton and grain sorghum are the main crops, but corn and small grain are also grown. The main objective in management is controlling erosion and improving tilth. Terracing and growing crops that produce large amounts of residue help control erosion and help maintain soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along the drainageways.

This soil has low potential for most urban uses. The limitations that affect urban development are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation. The potential for recreation is low. The clayey surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for openland and rangeland wildlife habitat is medium. Capability subclass IIe; Blackland range site.

15—Bunyan fine sandy loam, frequently flooded. This deep, well drained, nearly level soil is on flood plains of small streams. It is flooded two or three times each year; flooding lasts from several hours to several days. Some areas are smooth; others are channeled by numerous shallow drainageways. Slopes range from 0 to 1 percent and are plane. Individual areas are long, narrow bands paralleling the stream and range from 5 to 100 acres in size.

This soil has a surface layer of slightly acid fine sandy loam about 24 inches thick. The upper part, to a depth of 6 inches, is brown, and the lower part is pale brown. The underlying layer, to a depth of 80 inches, is yellowish brown, slightly acid fine sandy loam and thin strata of sandy clay loam.

This soil is easily worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is high. The root zone is deep and easily penetrated by plant roots. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Gowen soils. This included soil makes up 7 percent of this map unit.

This soil has very low potential for crops, recreation, and urban uses because of flooding, which can only be overcome by major flood control.

This soil has medium potential for pasture. It is well suited to improved bermudagrass, johnsongrass, and indiangrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees. Potential for openland wildlife habitat is low, and potential for rangeland wildlife habitat is medium. Capability subclass Vw; Loamy Bottomland range site.

16—Burleson clay, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is on stream terraces and uplands. Slopes are plane. Areas range from 10 to 125 acres in size.

This soil has a surface layer of dark gray, mildly alkaline clay about 5 inches thick. Below the surface is very dark gray, mildly alkaline clay to a depth of 19 inches. Between depths of 19 and 37 inches is dark gray, mildly alkaline clay. Below this layer, to a depth of 47 inches, is dark gray, moderately alkaline clay that has grayish brown mottles. The underlying layer, to a depth of 80 inches, is light brownish gray, moderately alkaline clay that has brownish yellow mottles.

This soil is sticky when wet and is difficult to work. When it is dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but penetration by roots is restricted by the clayey lower layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Houston Black, Branyon, and Wilson soils. The included soils make up 10 to 20 percent of this map unit.

This soil is used dominantly for crops. It has high potential for this use. The main crops are cotton and grain sorghum, but small grain and corn are also grown. The major objectives of management are maintaining tilth and fertility and providing adequate surface drainage. Proper management includes growing crops that produce large amounts of residue and maintaining smooth surface gradients.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along the drainageways.

This soil has low potential for most urban uses. The limitations that affect urban development are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. Potential for recreation is low. The clayey surface layer and very slow permeability are the most restrictive limitations for this use. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is low. Capability subclass IIw; Blackland range site.

17—Burleson clay, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on stream

terraces and uplands. Areas are on broad, convex ridges. They range from 10 to 100 acres in size.

This soil has a surface layer of dark gray, mildly alkaline clay about 42 inches thick. Below the surface layer, to a depth of 47 inches, is gray, mildly alkaline clay that has brownish yellow mottles. The underlying layer, to a depth of 80 inches, is light brownish gray, moderately alkaline clay that has brownish yellow mottles.

This soil is sticky and plastic when wet and is difficult to work. It is extremely hard when dry. Dense plowpans are common in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but root movement is very slow in the clayey lower layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Houston Black, Branyon, and Wilson soils. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly for crops. It has a high potential for this use. Grain sorghum, cotton, and small grain are the main crops. Controlling erosion and improving tilth are the major objectives in management of this soil. Terracing and growing crops that produce large amounts of residue help control erosion and maintain soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along the drainageways.

This soil has low potential for most urban uses. The limitations that affect urban development are the shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation. The potential for recreation is low. The clayey surface layer and very slow permeability are the most restrictive limitations for this use.

Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is low. Capability subclass IIe; Blackland range site.

18—Chazos loamy fine sand, 1 to 5 percent slopes. This deep, moderately well drained, gently sloping soil is on high stream terraces. Slopes are concave. Areas range from 20 to 150 acres in size.

This soil has a surface layer of slightly acid loamy fine sand about 12 inches thick. The upper part, to a depth of 6 inches, is light yellowish brown, and the lower part is very pale brown. Between depths of 12 and 22 inches is red, medium acid clay that has brownish yellow and light brownish gray mottles. Between the depths of 22 and 34 inches is yellowish brown, medium acid clay that has yellowish red, red, and grayish brown mottles; and between depths of 34 and 41 inches is brownish yellow, slightly acid clay that has light brownish gray, yellowish red, and red mottles. Between depths of 41 and 62 inches is brownish yellow, moderately alkaline sandy clay that has brown, yellowish red, and light brownish gray mottles. The underlying layer, to a depth of 72 inches, is pale brown, moderately alkaline sandy clay that has reddish yellow mottles. It is about 10 percent shaly clay.

This soil is easily worked throughout a wide range of moisture conditions. Permeability is slow, and available water capacity is medium. The root zone is deep, but root penetration is slow and difficult in underlying layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are some soils that have a sandy clay layer below the surface layer. Also included are a few intermingled areas of Axtell, Tabor, and Silstid soils. The included soils make up about 10 to 20 percent of this mapping unit.

This soil has medium potential for crops, but it is limited for this use by low natural fertility and medium available water capacity. The major crops are corn and small grain, but some grain sorghum is also grown. Some areas are used to grow such specialty crops as tomatoes and watermelons. The major objectives in management are controlling erosion, conserving moisture, improving soil tilth, and increasing fertility. Proper management includes growing a high-residue crop or deep-rooted legumes.

This soil is used mainly for pasture, and it has high potential for this use. It is suited to improved bermudagrass and weeping lovegrass. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is post oak, and blackjack oak savannah and an understory of mid and tall grasses.

This soil has medium potential for urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. Potential for recreation is medium. The sandy surface layer and the slow permeability are the most restrictive limitations for recreation use. Potential is high for both openland and rangeland wildlife habitat. Capability subclass IIIe; Loamy Sand range site.

19—Crockett fine sandy loam, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is on broad uplands and narrow ridgetops. Slopes are convex, and areas range from 50 to 200 acres in size.

This soil has a surface layer of brown, medium acid fine sandy loam about 10 inches thick. Between depths of 10 and 15 inches is reddish brown, medium acid clay that has reddish yellow and yellowish brown mottles. Between depths of 15 and 26 inches is brownish yellow, medium acid clay that has yellow and yellowish red mottles. Below this layer, to a depth of 37 inches, is light reddish brown, slightly acid clay that has yellowish red and yellow mottles. Very pale brown, neutral clay that has yellow, brownish yellow, and reddish yellow mottles is between depths of 37 and 56 inches. The underlying layer, to a depth of 80 inches, is light gray, moderately alkaline clay loam.

This soil is difficult to work; when dry, it forms extremely hard surface crusts. A dense plowpan forms in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Normangee and Wilson soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for crops. The major crops are small grain for winter grazing and grain sorghum. The major objectives in management of this soil are improving soil tilth, maintaining fertility, and controlling erosion. Proper management includes growing high-residue crops and deep-rooted legumes.

This soil has high potential for pasture. It is well suited to coastal bermudagrass, common bermudagrass, and weeping lovegrass. Good pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation. The potential for recreation is medium. The very slow permeability is the most restrictive limitation for this use. Potential for openland and rangeland wildlife habitat is medium. Capability subclass IIIs; Claypan Prairie range site.

20—Crockett fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands. Slopes are convex. Areas range from 35 to 400 acres in size.

This soil has a surface layer of brown, medium acid fine sandy loam about 9 inches thick. Between depths of 9 and 17 inches is mottled brownish yellow and red, medium acid clay that has grayish brown mottles. Below this layer, to a depth of 29 inches, is mottled yellow and grayish brown, medium acid clay, that has reddish yellow mottles. Between depths of 29 and 42 inches is brown, slightly acid clay that has brownish yellow mottles; and between depths of 42 and 53 inches is brownish yellow, neutral clay that has light brownish gray and reddish yellow mottles. Between depths of 53 and 73 inches is yellow, moderately alkaline sandy clay loam that has light brownish gray, white, and yellowish brown mottles. The underlying layer, to a depth of 80 inches, is mottled yellow light gray, and brownish yellow, moderately alkaline sandy clay loam.

Hard surface crusts and dense plowpans that form in cultivated areas make this soil difficult to work. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Normangee and Wilson soils and eroded Crockett soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited by low natural fertility and rapid loss of soil moisture during the summer. The major crops are small grain for winter grazing and grain sorghum. The major objectives in management are controlling erosion, maintaining fertility, and improving tilth. Terracing and growing high-residue crops and deep-rooted legumes help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to coastal bermudagrass, common bermudagrass, and weeping lovegrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams and in occasional motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. The very slow permeability is the most restrictive limitation for this use. Potential for openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Claypan Prairie range site.

21—Crockett fine sandy loam, 2 to 5 percent slopes, eroded. This deep, moderately well drained, gently sloping soil is on uplands. Soil areas are long, narrow bands that slope to natural drainageways. They range from 10 to 150 acres in size. Slopes are convex. Water erosion has removed part of the original surface layer. Many areas are dissected by gullies about 1 to 2 feet deep and 75 to 100 feet apart.

This soil has a surface layer of yellowish brown, medium acid fine sandy loam about 4 inches thick. Between depths of 4 and 12 inches is reddish brown, slightly acid clay that has reddish yellow and yellowish red mottles; and between depths of 12 and 29 inches is medium acid clay that is brown in the upper part and yellowish brown in the lower part. Mottles are brown and yellowish red. Between depths of 29 and 46 inches is brownish yellow, neutral sandy clay that has pinkish gray and light brownish gray mottles. The underlying layer, to a depth of 80 inches, is mottled brownish yellow and very pale brown, mildly alkaline sandy clay loam.

This soil is difficult to work. When dry, the surface becomes extremely hard. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is medium. The hazard of water erosion is moderately severe.

Included with this soil in mapping are a few intermingled areas of Normangee and Wilson soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has low potential for production of crops. The major crops are grain sorghum, cotton, and hay. The objectives in management are improving tilth, maintaining fertility, and controlling erosion. Terracing, growing crops that produce large amounts of residue, and growing deep-rooted legumes help to control erosion and maintain tilth.

This soil has medium potential for pasture. It is well suited to coastal bermudagrass, common bermudagrass, and weeping lovegrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along the streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. The very slow permeability and slope are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitats is medium. Capability subclass IVe; Claypan Prairie range site.

22—Desan loamy fine sand, 0 to 5 percent slopes. This deep, somewhat excessively drained, nearly level to gently sloping soil is on uplands and ancient stream terraces. Slopes are convex to concave, and areas range from 25 to 1,000 acres in size.

The soil has a surface layer of reddish yellow, neutral loamy fine sand about 54 inches thick. Below the surface layer, to a depth of 64 inches, is red, medium acid sandy clay loam. Between depths of 64 and 74 inches is reddish yellow, slightly acid fine sandy loam. The underlying layer, to a depth of 80 inches, is red, medium acid sandy clay loam.

This soil can be easily worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is low. The root zone is deep and easily penetrated by plant roots. Runoff is medium. The hazard of soil blowing is moderate, and the hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Padina, Silawa, and Silstid soils. The included soils make up 10 to 20 percent of the map unit.

This soil has low potential for production of crops, but it is limited by low natural fertility and low available water capacity. The major crops are corn and small grain. Some areas are used for such specialty crops as tomatoes and watermelons. The major objectives in management are controlling soil blowing, conserving moisture, and improving soil fertility. Proper management includes growing crops that produce large amounts of residue, strip-cropping, and fertilizing.

The soil is used mainly for pasture, but it has medium potential for this use. Use of this soil is limited by low natural fertility and low available water capacity. This soil is well suited to weeping lovegrass and improved bermudagrass. It is difficult to develop a firm seedbed. Emerging grass seedlings can be killed by the cutting action of blowing sand unless management practices for soil blowing are used. Weed control, controlled grazing, and fertilization are needed for sustained forage production.

This soil has low potential for range, but it is limited for this use by low available water capacity and low natural fertility. The climax plant community is an open savannah of post oak and blackjack oak and an understory of mid and tall grasses.

This soil has high potential for most urban uses. It is limited for shallow excavations by caving of the sandy surface layer. The potential for recreation is low. The sandy surface layer and the soil blowing hazard are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitats is medium. Capability subclass IIIe; Deep Sand range site.

23—Eddy gravelly clay loam, 1 to 5 percent slopes. This very shallow, well drained, gently sloping soil is on convex ridges and knobs and adjoining side slopes high on the landscape. Slopes are convex. Areas range from 5 to 25 acres in size.

This soil has a surface layer that, to a depth of 5 inches, is brown, moderately alkaline gravelly clay loam and is about 35 percent platy fragments of chalk. Between depths of 5 and 9 inches is brown, moderately alkaline very gravelly clay loam. Chalk fragments make up 60 percent of the upper part of this layer and 99 percent of the lower part. The underlying layer is white, weakly cemented chalk.

This soil has good tilth and can be worked throughout a wide range of moisture conditions, but the gravelly surface layer restricts proper tillage. Permeability is moderately slow, and available water capacity is very low. Runoff is rapid. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Austin and Stephen soils. The Austin soils are on broad ridges at lower elevations of the landscape, and the Stephen soils are intermingled with them. The included soils make up about 10 to 20 percent of this map unit.

This soil has very low potential for production of crops. Its use is limited by depth to rock and very low available water capacity.

This soil has low potential for pasture. It is well suited to King Ranch bluestem and kleingrass. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has low potential for range. The climax plant community is a mixture of tall and mid grasses, and an overstory of live oaks in small motts are scattered over the area.

This soil has low potential for urban uses. The shallow depth to rock is a limitation that is very difficult to overcome. Potential for recreation is medium. Stones, depth to rock, and slope are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is low. Capability subclass IVs; Chalky Ridge range site.

24—Ferris-Heiden complex, 5 to 12 percent slopes, severely eroded. This map unit consists of well drained,

sloping to strongly sloping soils on uplands. It is made up of small areas of Ferris and Heiden soils so intricately mixed that separation is not practical at the scale mapped. Most areas are rilled and are dissected by deep gullies that are 10 to 75 feet apart. Slopes are convex. Areas are in long narrow bands that range from 5 to 25 acres in size.

A typical map unit is 65 percent Ferris soils, 22 percent Heiden soils, and 13 percent gray and olive shaly clay in the bottoms of gullies. The Ferris soils occupy the sides of gullies and sloping areas leading to the gullies. The less eroded Heiden soils are between the gullies.

Typically, the Ferris soils have a surface layer of light yellowish brown, moderately alkaline clay about 10 inches thick. Between depths of 10 and 38 inches is light brownish gray, moderately alkaline clay. The soil is underlain by mottled light brownish gray and light gray, moderately alkaline shaly clay.

The Ferris soils are moderately deep to deep. Permeability is very slow, and available water capacity is high. Runoff is rapid. The hazard of erosion is severe.

Typically, the Heiden soils have a surface layer of dark grayish brown, moderately alkaline clay about 17 inches thick. Between depths of 17 and 35 inches is grayish brown, moderately alkaline clay. Between depths of 35 and 56 inches is olive, moderately alkaline clay that has olive yellow mottles. The underlying layer is light yellowish brown, moderately alkaline shaly clay that has yellow mottles.

The Heiden soils are deep. Natural fertility is high. Permeability is very slow, and the available water capacity is high. Runoff is rapid. The hazard of water erosion is severe.

These soils are not suitable for crops. They have low potential for pasture and urban use. The restrictive limitations are slope, shrinking and swelling with changes in moisture, gullies, slow percolation, and water erosion. Costly filling, shaping, and smoothing would be required to reclaim areas of these soils.

These soils have high potential for range, even though the climax vegetation has been destroyed by cultivation. They have potential for tall grasses, and live oak, elm, and hackberry trees.

The potential for recreation is low. The clayey surface layer, very slow permeability, and slope are the most restrictive limitations for this use. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is low. Capability subclass VIe; Ferris part in Eroded Blackland range site, Heiden part in Blackland range site.

25—Gaddy silt loam, occasionally flooded. This deep, somewhat excessively drained, nearly level soil is on flood plains of the Brazos River. It is flooded every 4 to 10 years for several hours. Areas are in long, narrow bands paralleling the river. Some areas have plane slopes and others are deeply channeled by drainageways. Slopes range from 0 to 1 percent. Individual areas range from 10 to about 95 acres in size.

This soil has a surface layer of light brown, moderately alkaline silt loam about 8 inches thick. Below the surface layer, to a depth of 14 inches, is stratified, light brown, moderately alkaline loamy fine sand and very pale brown, moderately alkaline silt loam. The underlying layer, to a depth of 80 inches, is pink, moderately alkaline fine sand.

This soil is easy to work throughout a wide range of moisture conditions. Permeability is moderately rapid, and the available water capacity is low. The root zone is deep and easily penetrated by roots. Runoff is slow, and the hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Yahola soils and Gaddy soils that have a loamy fine sandy surface layer. The Yahola soils are at higher elevations on the flood plain. The included soils make up less than 10 percent of this unit.

This soil has medium potential for production of crops, but it is limited by a low available water capacity. Proper management includes fertilization.

This soil has medium potential for pasture. It is well suited to improved bermudagrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has low potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees.

This soil has low potential for urban uses. It is limited by the danger of flooding. This limitation can be overcome only by major flood control. This soil has medium potential for recreation. Flooding is the most restrictive limitation for this use. Potential is high for openland wildlife habitat and medium for rangeland wildlife habitat. Capability subclass IIIw; Sandy Bottomland range site.

26—Gaddy soils, frequently flooded. This map unit consists of deep, somewhat excessively drained, nearly level soils along flood plains of the Brazos River. The texture of the surface layer varies in an irregular pattern from loamy fine sand to silt loam. These soils are flooded as frequently as two or three times a month during the rainy season; flooding lasts several hours to several days. Soil areas have plane slopes of less than 1 percent. They are long narrow bands that extend to the edge of the river. They range from 10 to 200 acres in size.

A typical map unit is about 60 percent Gaddy soils that have a loamy fine sand surface layer, 33 percent Gaddy soils that have a fine sandy loam surface layer, and 4 percent Gaddy soils that have a silt loam surface layer. Also included are 3 percent Weswood and Yahola soils. The Weswood and Yahola soils are on higher parts of the flood plain between the Gaddy soils and uplands.

Typically, these soils have a surface layer of light brown, moderately alkaline loamy fine sand about 7 inches thick. The underlying layer, to a depth of 80 inches, is very pale brown, moderately alkaline fine sand.

Permeability is rapid, and the available water capacity is low. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is slight.

These soils have low potential for crops, recreation, and urban uses. The most restrictive limitation is flooding, which can be overcome only by major flood control.

These soils have medium potential for pasture. They are well suited to improved bermudagrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

These soils have low potential for range. The climax plant community is tall and mid grasses and an overstory of oak, elm, sycamore, and black willow trees.

Potential of these soils for both openland and rangeland wildlife habitat is high. Capability subclass Vw; Sandy Bottomland range site.

27—Gowen clay loam, occasionally flooded. This deep, well drained, nearly level soil is in protected areas of the flood plains of major streams. It is flooded every 4 to 10 years, and then only for several hours. Areas are long and narrow to irregular in shape. They range from 10 to 200 acres in size. Slopes are plane and 0 to 1 percent.

This soil has a surface layer of very dark grayish brown, neutral clay loam about 20 inches thick. Below the surface layer, to a depth of 36 inches, is dark grayish brown, neutral clay loam. The underlying layer, to a depth of 80 inches, is brown, neutral clay loam and stratified, grayish brown fine sandy loam.

This soil is easily worked. Permeability is moderate, and the available water capacity is high. Roots easily penetrate the deep root zone. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Bunyan, Ovan, and Trinity soils. Also included are a few soils in narrow drainageways that carry floodwater when the main stream overflows its bank. These included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The main crops are grain sorghum and cotton. The major management objective is maintaining soil tilth and fertility. Growing a high-residue crop or a cool-season legume helps soil tilth.

This soil is well suited to pasture and has high potential for this use. It is well suited to improved bermudagrass, johnsongrass, common bermudagrass, and kleingrass. Proper management on this soil includes fertilization, controlled grazing, and weed control.

The soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, and cottonwood trees.

This soil has low potential for urban uses because of the danger of flooding. Potential for recreation is medium. Flooding is the most restrictive limitation for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability subclass IIw; Loamy Bottomland range site.

28—Gowen clay loam, frequently flooded. This deep, well drained, nearly level soil is on flood plains along major streams. It is flooded two or three times each year; flooding lasts from several hours to several days. Areas have plane slopes of 0 to 1 percent. These areas are on flood plains in long, narrow bands and are dissected by old creek beds and by meandering channels. Individual areas range from 20 to about 200 acres in size.

The soil has a surface layer of very dark grayish brown, neutral clay loam about 23 inches thick. Below the surface layer, to a depth of 36 inches, is brown, neutral clay loam. The underlying layer, to a depth of 80 inches, is dark grayish brown, neutral clay loam stratified with fine sandy loam and clay in the lower part.

Permeability is moderate, and the available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Bunyan and Trinity soils and areas of Gowen soils that are not flooded each year. The included soils make up about 15 percent of this map unit.

This soil has low potential for production of crops, recreation, and urban uses. The most restrictive limitation is flooding, which can only be overcome by major flood control.

This soil is well suited to pasture and has high potential for this use. It is well suited to improved bermudagrass, johnsongrass, common bermudagrass, and kleingrass. Proper management includes fertilization, controlled grazing, and weed control.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of scattered oak, pecan, hackberry, elm, and cottonwood trees.

This soil has low potential for openland wildlife habitat and medium potential for rangeland wildlife habitat. Capability subclass Vw; Loamy Bottomland range site.

29—Heiden clay, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on narrow ridges and foot slopes of the uplands. Slopes are convex. Areas are long and are narrow to broad. They range from 10 to about 120 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline clay about 21 inches thick. Between depths of 21 to 45 inches is grayish brown, moderately alkaline clay that has light yellowish brown mottles. The underlying material, to a depth of 80 inches, is yellow, moderately alkaline shaly clay.

This soil is difficult to work. When wet, it is sticky; when dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but penetration by roots is slow. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Houston Black, Branyon, and Trinity soils. The Branyon soils occupy stream terraces and the Trinity soils are on flood plains. Houston Black soils are intermingled irregularly. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly for crops. The potential for crops is high. Cotton and grain sorghum are the main crops, but corn and small grain are also grown. The main objectives of management are controlling erosion and improving tilth. Terracing and growing crops that produce large amounts of residue help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along drainageways.

This soil has low potential for most urban uses. The limitations that affect urban development are the shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. The potential for recreation is low. The most restrictive limitations for this use are the clayey surface layer and the very slow permeability. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is low. Capability subclass IIe; Blackland range site.

30—Heiden clay, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands. Slopes are convex. Areas are long and narrow and range from 5 to 20 acres in size.

The surface layer of this soil, to a depth of 20 inches, is dark grayish brown, moderately alkaline clay. Between depths of 20 and 41 inches is olive, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is yellow, moderately alkaline clay that has olive yellow mottles.

This soil is difficult to work. When wet, it is sticky and plastic; when dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. The permeability is very slow, and the available water capacity is high. The root zone is deep, but penetration by roots is slow. Runoff is slow. The hazard of water erosion is moderately severe.

Included with this soil in mapping are small areas of Ferris, Houston Black, Burleson, and Trinity soils. The Ferris soils occupy gullies and steeper side slopes. The Houston Black and Burleson soils are on less sloping parts of the landscape and the Trinity soils occupy flood plains. The included soils make up 10 percent of this map unit.

This soil is used about equally for crops and pasture. It has medium potential for production of crops, but it is limited by slope. Grain sorghum, cotton, and small grain are the main crops. The main objectives of management are controlling erosion and improving tilth. Terracing and growing crops that produce large amounts of residue help control erosion and maintain soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along drainageways.

This soil has low potential for most urban uses. The limitations that affect urban development are the shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. The potential for recreation is low. The clayey surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is low. Capability subclass IIIe; Blackland range site.

31—Heiden clay, 2 to 5 percent slopes, eroded. This deep, well drained, gently sloping soil is on uplands. Most areas are rilled and have shallow gullies that are 100 to 200 feet apart. Slopes are convex. Areas are long and narrow and range from 10 to about 80 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline clay about 17 inches thick. Between depths of 17 and 43 inches is grayish brown, moderately alkaline clay. The underlying layer is light yellowish brown, moderately alkaline clay.

This soil is difficult to work. When wet, it is sticky and plastic; when dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but penetration by roots is slow. Runoff is rapid. The hazard of water erosion is moderately severe.

Included with this soil in mapping are small areas of Ferris soils. This soil occupies shallow gullies and adjoining slopes. This soil makes up about 18 percent of this map unit.

Some areas of this soil are still cultivated, but most areas are now in pasture. This soil has medium potential for production of crops, but it is limited for this use because the surface layer has been eroded away. Grain sorghum, cotton, and small grain are the main crops. The main objectives of management are controlling erosion and improving tilth. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along the drainageways.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. The potential for recreation is low. The clayey surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for openland wildlife habitat is medium, and potential for

rangeland wildlife habitat is low. Capability subclass IIIe; Blackland range site.

32—Heiden-Ferris complex, 5 to 8 percent slopes, eroded. This map unit consists of well drained, sloping soils on uplands. It is made up of small areas of Heiden and Ferris soils so intermingled that separation is not practical at the scale selected for mapping. Most areas are rilled and have shallow gullies that are 100 to 150 feet apart. They are on convex, complex side slopes. Areas are long and narrow and range from 5 to about 150 acres in size.

A typical area of this map unit is 53 percent Heiden soils and 47 percent Ferris soils. The Ferris soils occupy the gullies and the adjoining slopes. The Heiden soils are eroded and occupy areas between gullies.

Typically, the Heiden soils have a surface layer of dark grayish brown, moderately alkaline clay about 18 inches thick. Between depths of 18 and 43 inches is grayish brown, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is olive yellow, moderately alkaline clay.

The Heiden soils are deep. Permeability is very slow, and available water capacity is high. Runoff is rapid. The hazard of water erosion is severe.

Typically, the Ferris soils have a surface layer of light yellowish brown, moderately alkaline clay about 8 inches thick. Between depths of 8 and 32 inches is olive yellow, moderately alkaline clay. The underlying layer, to a depth of 45 inches, is yellow, moderately alkaline shaly clay.

The Ferris soils are moderately deep to deep. Permeability is very slow, and available water capacity is high. Runoff is rapid. The hazard of water erosion is severe.

These soils are not suited to crops. They have low potential for pasture, recreation, and urban uses. The most restrictive limitations are shrinking and swelling with changes in moisture, slope, hazard of erosion, corrosivity to uncoated steel, and very slow permeability.

These soils have high potential for range. The climax plant community is tall grasses and an overstory of live oak, elm, and hackberry trees along the drainageways.

Potential for openland wildlife habitat is medium, and potential for rangeland wildlife habitat is low. Capability subclass IVe; Heiden part is Blackland range site, Ferris part is Eroded Blackland range site.

33—Highbank silty clay loam. This deep, well drained, nearly level soil is on high flood plains of the Brazos River. It is flooded only once every 4 to 10 years; flooding lasts for several hours. Slopes are plane and are 0 to 1 percent. Areas range from 25 to 150 acres in size.

This soil has a surface layer of reddish brown, moderately alkaline silty clay loam about 14 inches thick. Below the surface layer, to a depth of 24 inches, is reddish brown, moderately alkaline silty clay. The underlying layer, to a depth of 62 inches, is reddish brown, moderately alkaline clay.

This soil is easily worked throughout a wide range of moisture conditions. Permeability is slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in lower layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small intermingled areas of Ships, Weswood, and Yahola soils. The included soils make up about 10 to 20 percent of this map unit.

This soil is used mainly for crops, and it has high potential for this use. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The main objectives of management are maintaining tilth and fertility. Growing crops that produce large amounts of residue and growing deep-rooted legumes help maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper pasture management includes fertilization, controlled grazing, and weed control.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees.

This soil has low potential for urban uses because of the danger of flooding. The potential for recreation is medium. The clayey surface layer and flooding are the most restrictive limitations for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability subclass IIs; Loamy Bottomland range site.

34—Houston Black clay, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is on smooth ridges of uplands. Slopes are plane. Areas are long and narrow to broad. They range from 10 to about 175 acres in size.

This soil has a surface layer of dark gray, moderately alkaline clay about 25 inches thick. Between depths of 25 and 44 inches is gray, moderately alkaline clay; and between depths of 44 and 80 inches is light brownish gray, moderately alkaline clay that has pale brown mottles.

This soil is difficult to work. When wet, it is sticky and plastic; when dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. The permeability is very slow, and the available water capacity is high. The root zone is deep, but penetration by roots is slow. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Branyon, Burleson, and Heiden soils. The Branyon soils are on stream terraces. The Heiden and Burleson soils are intermingled irregularly. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly for crops. The potential for crops and small grain is high. The main crops are cotton and grain sorghum, but small grain and corn are also grown. The major objectives of management are maintaining tilth and fertility. Growing crops that produce a large amount of residue and growing deep-rooted legumes assist in maintaining tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along drainageways.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation. The potential for recreation is low. The clayey surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIw; Blackland range site.

35—Houston Black clay, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on smooth ridges on foot slopes of uplands. Slopes are convex. Areas are long and narrow to broad in shape and range from 10 to 50 acres in size.

The soil has a surface layer of very dark gray, moderately alkaline clay to a depth of 28 inches. The next layer is dark gray, moderately alkaline clay to a depth of 48 inches. Between depths of 48 and 67 inches is olive gray, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is olive yellow and light brownish gray, moderately alkaline clay that has brownish yellow mottles.

This soil is difficult to work. When wet, it is sticky; when dry, it is hard and clods when plowed. Dense plowpan layers are common in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but penetration by roots is slow. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Branyon, Burleson, and Heiden soils. The Branyon soils are on stream terraces. The Burleson and Heiden soils have no particular pattern of occurrence. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly for crops. The potential for growing crops is high. Cotton and grain sorghum are the main crops, but corn and small grain are also grown. The main objectives of management are controlling erosion and improving tilth. Growing crops that produce large amounts of residue or growing deep-rooted legumes help control erosion and maintain the tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, kleingrass, and King Ranch bluestem. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range, but very few acres are used for this purpose. The climax plant community is tall grasses and an overstory of a few large live oak, elm, and hackberry trees along the drainageways.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, low strength, and slow percolation.

The potential for recreation is low. The clayey surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIe; Blackland range site.

36—Lewisville silty clay, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on terraces along the major streams. Slopes are plane and convex. Areas are long narrow bands or irregular in shape and range from 15 to about 100 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 15 inches thick. Between depths of 15 and 34 inches is brown, moderately alkaline silty clay. Between depths of 34 and 50 inches is strong brown, moderately alkaline silty clay. Below this layer, to a depth of 65 inches, is light brown, moderately alkaline silty clay.

This soil has good tilth and is easily worked. Permeability is moderate, and available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few areas of Lewisville soils that have slopes of less than 1 percent and some Lewisville soils that have been slightly damaged by erosion. Also included are a few intermingled areas of Altoga, Ferris, and Heiden soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The main objectives of management are controlling erosion and improving tilth. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help to control erosion and maintain tilth.

This soil has a high potential for pasture. It is well suited to coastal bermudagrass, kleingrass, and weeping lovegrass. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses, an overstory of hackberry, elm, and pecan trees along drainageways; and scattered oak trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and low strength. The potential for recreation is medium. The most restrictive limitation for this use is the clayey surface layer. Potential for both openland and rangeland wildlife habitats is medium. Capability subclass IIe; Clay Loam range site.

37—Lewisville silty clay, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on terraces along the major streams. Slopes are convex. Areas are long and narrow to irregular in shape and range from 5 to 80 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 11 inches thick. Between depths of 11 and 36 inches is olive brown, moderately alkaline silty clay. The underlying layer, to a depth of 12 inches is light yellowish brown, moderately alkaline silty clay.

This soil has good tilth and can be easily worked. Permeability is moderate, and available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few areas of Lewisville soils that have been moderately damaged by water erosion. Also included are a few intermingled areas of Altoga, Ferris, and Heiden soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited by slope and size of the area. The major crops are grain sorghum and small grain, but cotton and corn are also grown. The management objectives are controlling erosion and improving fertility and soil tilth. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to coastal bermudagrass, kleingrass, and weeping lovegrass. Fertilization, weed control, and controlled grazing are needed to properly manage pasture.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses; an overstory of hackberry, elm, and pecan trees along drainageways; and scattered oak trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, and corrosivity to uncoated steel. The potential for recreation is medium. The clayey surface layer is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitats is medium. Capability subclass IIIe; Clay Loam range site.

38—Lott silty clay, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on uplands. Slopes are convex. Areas range from 10 to 200 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 15 inches thick. The subsoil, to a depth of 47 inches, is moderately alkaline silty clay. It is brown to a depth of 30 inches and pale brown below. The underlying layer, to a depth of 80 inches, is mottled light gray, white, and yellow, chalky marl that has a few chalk fragments in the upper part.

This soil has good tilth and is easily worked. Permeability is moderately slow, and available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Austin, Houston Black, and Heiden soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The major objectives of management are controlling erosion and improving tilth. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help control erosion and maintain the tilth.

This soil has high potential for pasture. It is well suited to coastal bermudagrass, kleingrass, and weeping lovegrass. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses; an overstory of hackberry, elm, and pecan trees along drainageways, and scattered oak trees.

This soil has low potential for most urban uses. Its most restrictive limitation is shrinking and swelling with changes in moisture, low strength, and corrosivity to uncoated steel. The potential for recreation is low. The clayey surface layer is the most restrictive limitation to this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability subclass IIe; Clay Loam range site.

39—Lott silty clay, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands. Slopes are convex. Areas are in long narrow bands, and the soil slopes to natural drainageways. Areas range from 10 to 50 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 14 inches thick. The subsoil, to a depth of 45 inches, is moderately alkaline silty clay. It is pale brown to a depth of 32 inches and light yellowish brown below. The underlying layer, to a depth of 80 inches, is mottled yellow and very pale brown, chalky marl.

This soil has good tilth and can be easily worked. Permeability is moderately slow, and the available water capacity is medium. The root zone is deep and easily penetrated by roots. This soil has medium runoff. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Austin, Heiden, and Lewisville soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by slope and size of the area. The major crops are grain sorghum and small grain, but cotton and corn are also grown. The management objectives are controlling erosion, and improving fertility and soil tilth. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help to control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to coastal bermudagrass, kleingrass, and weeping lovegrass. Fertilization, weed control, and controlled grazing are needed to properly manage pastures.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses; hackber-

ry, elm, and pecan trees along drainageways; and scattered oak trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is low. The clayey surface layer is the most restrictive limitation for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability subclass IIIe; Clay Loam range site.

40—Normangee clay loam, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is on uplands. Slopes are plane. Areas range from 5 to 100 acres in size.

This soil has a surface layer of dark brown, neutral clay loam about 8 inches thick. Between depths of 8 and 18 inches is brown, neutral clay that has yellowish red mottles. Between depths of 18 and 32 inches is pale brown and grayish brown, moderately alkaline clay that has brownish yellow, yellowish red, and reddish yellow mottles. Between depths of 32 and 44 inches is pale brown, moderately alkaline clay that has reddish yellow and brownish yellow mottles. The underlying layer, to a depth of 60 inches, is light brownish gray, moderately alkaline clay that has very pale brown and yellowish red mottles.

This soil is difficult to work; when dry, it becomes extremely hard, and when wet, it is sticky. The surface crusts and dense plowpans form in cultivated areas. Permeability is very slow, and the available water capacity is high. The root zone is deep, but penetration is slow and difficult in the underlying layers. This soil has slow runoff. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Crockett and Wilson soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The major crops are grain sorghum and small grain for winter grazing. The main objectives of management are maintaining fertility, improving soil tilth, and controlling erosion. Growing legumes and crops that produce large amounts of residue help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to King Ranch bluestem, coastal bermudagrass, and weeping lovegrass. Proper pasture management includes weed control, fertilization, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along the streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. The clay loam surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIs; Claypan Prairie range site.

41—Normangee clay loam, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands. Slopes are convex. Areas range from 10 to about 175 acres in size.

This soil has a surface layer of brown, neutral clay loam about 8 inches thick. Between depths of 8 and 17 inches is brown, neutral clay that has dark brown and dark grayish brown mottles. Between depths of 17 and 30 inches is brown, neutral clay that has strong brown and dark grayish brown mottles. Between the depths of 30 and 42 inches is grayish brown, neutral clay that has mottles of strong brown, brownish yellow, and pale brown. The underlying layer, to a depth of 60 inches, is light brownish gray, mildly alkaline clay that has mottles of light yellowish brown, dark yellowish brown, and strong brown.

When dry, this soil becomes extremely hard; when wet, it is sticky. Dense plowpans and surface crusts that form in cultivated areas make this soil difficult to work. Permeability is very slow, and the available water capacity is high. The root zone is deep, but penetration is slow and difficult in the underlying layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Crockett, Wilson, and eroded Normangee soils. The included soils make up less than 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by low natural fertility and rapid loss of soil moisture during the summer. The major crops are grain sorghum and small grain for winter grazing. The major objectives of management are controlling erosion and improving fertility and tilth. Terracing and growing crops that produce large amounts of residue and deep-rooted legumes help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to King Ranch bluestem, coastal bermudagrass, and weeping lovegrass. Proper pasture management includes weed control, fertilization, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along the streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. The clay loam surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Claypan Prairie range site.

42—Normangee clay loam, 2 to 5 percent slopes, eroded. This deep, moderately well drained, gently sloping soil is on uplands. Areas are in long narrow bands, and the soil slopes to natural drainageways. Slopes are

convex. Part of the original surface layer has been removed by water erosion. Many areas are dissected by gullies that are 1 to 3 feet deep and about 75 to 100 feet apart. Mapped areas range from 20 to 100 acres in size.

This soil has a surface layer of dark brown, neutral clay loam about 4 inches thick. Between depths of 4 and 15 inches is brown, neutral clay that has red and reddish brown mottles. Between depths of 15 and 29 inches is brown, moderately alkaline clay that has yellow and reddish brown mottles; and between depths of 29 and 42 inches is light yellowish brown, moderately alkaline clay that has light gray and yellow mottles. The underlying layer, to a depth of 60 inches, is brownish yellow, moderately alkaline clay loam that has light red and light brownish gray mottles.

This soil is difficult to work. When wet, it is sticky; when dry, it becomes extremely hard. Surface crusts and dense plowpans form in cultivated areas. Permeability is very slow, and the available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is rapid. The hazard of water erosion is severe.

Included with this soil in mapping are a few intermingled areas of eroded Crockett soils. The included soils make up less than 15 percent of this map unit.

This soil has low potential for production of crops. It is limited for this use by the low natural fertility, rapid loss of soil moisture, and loss of the surface layer by water erosion. Where cultivated, the major crops are grain sorghum and corn. Management objectives are improving tilth, maintaining fertility, and controlling erosion. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help control erosion and maintain tilth.

This soil has high potential for pasture. It is well suited to King Ranch bluestem, coastal bermudagrass, and weeping lovegrass. Proper pasture management includes weed control, fertilization, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along the streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. The clay loam surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IVe; Claypan Prairie range site.

43—Ovan silty clay, occasionally flooded. This deep, moderately well drained, nearly level soil is on the upper part and protected parts of flood plains along major streams. It is flooded only once every 4 to 10 years; flooding lasts for several hours. Areas are long and narrow. They range from 50 to about 500 acres in size. Slopes are 0 to 1 percent.

This soil has a surface layer of dark brown, moderately alkaline silty clay about 20 inches thick. Between depths of 20 and 41 inches is brown, moderately alkaline silty clay. The underlying layer is brown, moderately alkaline silty clay to a depth of 80 inches.

This soil is easily worked throughout a wide range of moisture conditions. The surface crusts and plowpans that form in cultivated areas are generally weak and do not curtail plant growth. Permeability is very slow, and the available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Trinity soils. Also included are a few soils in narrow drainageways that carry floodwater when the main stream overflows its banks. These included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The main crops are grain sorghum and cotton. The major management objectives are maintenance of tilth and fertility. Growing crops that produce large amounts of residue and growing legumes help to maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Fertilization, controlled grazing, and weed control are needed to maintain high forage yields.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees along the stream.

This soil has low potential for urban uses. Its most restrictive limitations are flooding and the shrinking and swelling with the changes in moisture. Potential for recreation is low. Flooding, the clayey surface layer, and the very slow permeability are the most restrictive limitations for this use. Potential for openland wildlife habitats is medium, and potential for rangeland wildlife habitats is low. Capability subclass IIIw; Clayey Bottomland range site.

44—Ovan silty clay, frequently flooded. This deep, moderately well drained, nearly level soil is on flood plains of major streams. It is flooded two or three times each year; flooding lasts for several hours to several days. Areas are long narrow bands paralleling the stream channel. They have plane slopes of 0 to 1 percent. Individual areas range from 50 to 900 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 46 inches thick. The underlying layer, to a depth of 80 inches, is grayish brown, moderately alkaline silty clay.

Permeability is very slow, and the available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is slow, and the hazard of water erosion is slight.

Included with this soil in mapping are a few areas of Ovan soils that are not flooded annually and intermingled areas of Trinity soils. The included soils make up less than 20 percent of this map unit.

This soil has low potential for production of crops, recreation, and urban uses. Its potential is limited by flooding, which can only be overcome by major flood control.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper pasture management includes fertilization, controlled grazing, and weed control.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees along the streams.

This soil has low potential for both openland and rangeland wildlife habitat. Capability subclass Vw; Clayey Bottomland range site.

45—Padina fine sand, 0 to 5 percent slopes. This deep, moderately well drained, nearly level to gently sloping soil is on uplands and ancient stream terraces. Slopes are concave and convex. Areas range from 75 to 800 acres in size.

This soil has a surface layer of medium acid fine sand about 49 inches thick. It is pale brown to a depth of 8 inches and very pale brown below. Between depths of 49 and 65 inches is very pale brown, strongly acid sandy clay loam that has strong brown and light gray mottles. Between depths of 65 and 80 inches is white, strongly acid sandy clay loam that has reddish yellow and red mottles (fig. 8).

The surface layer has a perched water table for short periods following heavy rainfalls. Permeability is moderately slow, and available water capacity is low. The root zone is deep and is easily penetrated by roots. Runoff is slow. The hazard of soil blowing is moderate to severe, and the hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Desan, Silawa, and Silstid soils. The included soils make up about 20 percent of this map unit.

This soil has low potential for production of crops. It is limited for this use by low natural fertility and low available water capacity. The major crops are corn and small grain. Some areas are used for such specialty crops as tomatoes and watermelons. The major objectives of management are controlling soil blowing, conserving moisture, and improving soil fertility. Proper management includes stripcropping, fertilization, and growing crops that produce large amounts of residue.

This soil is used dominantly for pasture and has medium potential for this use. It is limited by low natural fertility and low available water capacity. It is well suited to weeping lovegrass and improved bermudagrass. Making a firm seedbed is difficult. Emerging grass seedlings can be killed by cutting action of blowing sand unless practices that control soil blowing are used. Weed control, controlled grazing, and fertilization are needed to sustain production.

This soil has low potential for range. It is limited for this use by low available water capacity and low natural fertility. The climax plant community is an open savannah of post oak and blackjack oaks and an understory of mid and tall grasses.

This soil has high potential for urban uses. Its most restrictive limitations are occasional wetness and the hazard of cutbanks caving. The potential for recreation is low. The sandy surface layer is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Deep Sand range site.

46—Roetex clay, frequently flooded. This deep, somewhat poorly drained to poorly drained nearly level soil is on flood plains of the Brazos River. It floods two or three times each year; flooding lasts many days (fig. 9). Areas are in long, narrow bands along alternate channels and restricted drainageways. Slopes are slightly concave and are 0 to 1 percent. The outer edges of the area are sloping, and the flatter middle areas are flooded with runoff water. Individual areas range from 10 to 350 acres in size.

This soil has a surface layer of reddish brown, moderately alkaline clay about 12 inches thick. Between depths of 12 and 20 inches is reddish brown, moderately alkaline silty clay that has grayish brown and greenish gray mottles; and between depths of 20 and 54 inches is red, moderately alkaline silty clay that has grayish brown, dark gray, and greenish gray mottles. The underlying layer, below a depth of 54 inches, is reddish brown, moderately alklaine silty clay that has grayish brown mottles.

Permeability is very slow, and available water capacity is high. The root zone is deep, but clayey lower layers restrict root penetration. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few areas of Ships soils along the outer edges of the area. This included soil makes up about 10 percent of the map unit.

This soil has low potential for production of crops, recreation, and urban uses. It is limited for this use by flooding and ponding. The clayey surface layer is also a restrictive limitation.

This soil has low potential for pasture. It is limited for this use by flooding and by ponding of runoff water. It is well suited to improved bermudagrass and common bermudagrass.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees adjacent to the stream.

Potential for openland wildlife habitat is low, and potential for rangeland wildlife habitat is medium. Capability subclass Vw; Clayey Bottomland range site.

47—Satin clay loam, 1 to 5 percent slopes. This deep, well drained, gently sloping soil is on upland ridges and upper parts of side slopes. Slopes are convex. Areas range from 15 to 145 acres in size.

This soil has a surface layer of black, mildly alkaline clay loam about 5 inches thick. Between depths of 5 and 11 inches is black, moderately alkaline very gravelly clay;

and between depths of 11 and 18 inches is brown, moderately alkaline very gravelly clay. Between the depths of 18 and 34 inches is brown, moderately alkaline very gravelly clay that has brown mottles. The underlying material, to a depth of 80 inches, is light yellowish brown and light gray, moderately alkaline clayey marl.

Surface crusts, plowpans, and very gravelly lower layers make this soil difficult to work. Permeability is slow, and the available water capacity is medium. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is medium. This soil has a moderate hazard of water erosion on the steeper slopes.

Included with this soil in mapping are a few intermingled areas of Burleson and Wilson soils. The included soils make up about 10 to 20 percent of ths map unit.

This soil has low potential for production of crops. It is limited for this use by low available water capacity and gravelly layers. The major crops are grain sorghum, cotton, and corn. Improving fertility and improving soil tilth are the objectives of management. Growing small grain or other close-spaced crops help to maintain the soil tilth.

This soil has low potential for pasture. It is well suited to coastal bermudagrass, King Ranch bluestem, and weeping lovegrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has low potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of live oak, elm, mesquite, and hackberry trees.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. The clay loam surface layer and the slow permeability are the most restrictive limitations for this use. Potential for openland wildlife habitat is low, and potential for rangeland wildlife habitat is medium. Capability subclass IVs; Gravelly Loam range site.

48—**Ships clay.** This deep, moderately well drained, nearly level soil is on flood plains of the Brazos River. It is rarely flooded. Areas are long and narrow. They range from 50 to about 200 acres in size. Slopes are plane and are 0 to 1 percent.

This soil has a surface layer of reddish brown, moderately alkaline clay about 34 inches thick. The subsoil, to a depth of 54 inches, is red, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is reddish brown, moderately alkaline clay.

This soil is difficult to work. When wet, it is sticky; and when dry, it is extremely hard and clods when plowed. Permeability is very slow, and the available water capacity is high. The root zone is deep, but dense plowpan layers that form in cultivated areas restrict root penetration. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Highbank, Roetex, Yahola, and Weswood soils. The Weswood and Highbank soils are intermingled. The Yahola soils are at a lower elevation on the flood plain, and the Roetex soils are in the less well drained positions. These included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The major crops are cotton and grain sorghum, and some corn is also grown. The major objectives of management are maintaining tilth and fertility. Growing crops that produce large amounts of residue or growing deep-rooted legumes assists in maintaining the soil tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees along the stream.

This soil has low potential for urban uses. Its most restrictive limitations are flooding, shrinking and swelling with changes in moisture, corrosivity to uncoated steel, and slow percolation. The potential for recreation is low. The clayey surface layer and the very slow permeability are the most restrictive limitations for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability subclass IIs; Clayey Bottomland range site.

49—**Ships clay, frequently flooded.** This deep, moderately well drained, nearly level soil is on flood plains along Little Brazos River, Big Creek, and Brazos River. It is flooded as often as 1 to 3 times a month during the winter and spring for as long as one or two days. This soil is in depressions. It has concave slopes of 0 to 1 percent. Individual areas range from 100 to about 600 acres in size.

This soil has a surface layer of dark brown, moderately alkaline clay about 22 inches thick. Between depths of 22 and 50 inches is reddish brown, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is reddish brown, moderately alkaline clay stratified with silty clay loam.

Permeability is very slow, and the available water capacity is high. The root zone is deep, but the clayey texture restricts root penetration and development. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Roetex soils and some areas of Ships soils which are not flooded each year. The included soils make up about 10 percent of this map unit.

This soil has low potential for production of crops and urban uses. Flooding is the most restrictive limitation.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees along the stream.

The potential for recreation is low. The flooding hazard and the clayey surface layer are the most restrictive limitations. Potential for openland wildlife habitat is low, and potential for rangeland wildlife habitat is medium. Capability subclass Vw; Clayey Bottomland range site.

50—Silawa loamy fine sand, 0 to 3 percent slopes. This deep, well drained, nearly level to gently sloping soil is on high stream terraces. Slopes are convex. Areas range from 10 to about 150 acres in size.

This soil has a surface layer of slightly acid loamy fine sand about 16 inches thick. The layer is dark yellowish brown to a depth of 10 inches and brown below. Between depths of 16 and 53 inches is yellowish red, medium acid sandy clay loam; and between depths of 53 and 70 inches is reddish yellow, strongly acid fine sandy loam. The underlying layer, to a depth of 80 inches, is reddish yellow, strongly acid loamy fine sand.

This soil can be worked throughout a wide range of moisture conditions. Permeability is moderate, and the available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of soil blowing is moderate, and the hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Silawa fine sandy loam and Desan and Chazos soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by low natural fertility and medium available water capacity. The major crops are corn and such specialty crops as tomatoes and watermelons. The major objectives of management are controlling erosion, conserving moisture, improving tilth, and increasing fertility. Proper management includes growing crops that produce large amounts of residue and growing deep-rooted legumes.

This soil is used mainly for pasture, but it has medium potential for this use. It is well suited to improved bermudagrass and weeping lovegrass. Proper pasture management includes several applications of a complete fertilizer, weed control, and controlled grazing.

This soil has high potential for range, but it is limited for this use by low natural fertility and medium available water capacity. The climax plant community is an open savannah of post oak and blackjack oak and an understory of tall and mid grasses.

This soil has high potential for urban uses. Its most restrictive limitation is low strength. The potential for recreation is medium. The sandy surface layer is the most restrictive limitation. Potential for both openland and rangeland wildlife habitat is high. Capability subclass IIIe; Loamy Sand range site.

51—Silawa fine sandy loam, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on high stream terraces. Slopes are convex. Areas are oval and range from 10 to 50 acres in size.

This soil has a surface layer of slightly acid fine sandy loam about 13 inches thick. This layer is pale brown to a depth of 6 inches and light yellowish brown below. Between depths of 13 and 38 inches is red, medium acid sandy clay loam. Between depths of 38 and 59 inches is red, medium acid fine sandy loam. The underlying layer, to a depth of 70 inches, is red, medium acid loamy fine sand.

This soil can be worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Silawa loamy fine sand and Axtell, Tabor, and Chazos soils. The included soils make up 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The major crops are corn, small grain, and such specialty crops as tomatoes and watermelons. The major objectives of management are controlling erosion, maintaining tilth, and conserving moisture. Terracing and growing crops that produce large amounts of residue help to control erosion and to maintain tilth.

This soil is used mainly for pasture, and it has high potential for this use. It is well suited to improved bermudagrass, weeping lovegrass, and kleingrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a post oak and blackjack oak savannah, and an understory of mid and tall grasses.

This soil has high potential for urban uses and recreation. Potential for both openland and rangeland wildlife habitat is high. Capability subclass IIe; Sandy Loam range site.

52—Silawa fine sandy loam, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on ridges and side slopes. Soil areas are in long narrow bands and have convex slopes. Individual areas are about 5 to 40 acres in size.

This soil has a surface layer of fine sandy loam about 11 inches thick. This layer is dark grayish brown and slightly acid to a depth of 4 inches and brown and medium acid below. Between depths of 11 and 32 inches is yellowish red, and strongly acid sandy clay loam. Between depths of 32 and 45 inches is reddish yellow, strongly acid fine sandy loam. The underlying layer, to a depth of 80 inches, is reddish yellow, strongly acid loamy fine sand.

This soil can be worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of water erosion is moderately severe.

Included with this soil in mapping are some soils that have a gravelly sandy clay loam layer at depths of 11 to 32 inches. Also included are areas of Silawa soils that have short slopes of 5 to 7 percent and areas that have a few shallow gullies. A few intermingled areas of Silawa loamy fine sand and Axtell soils are also included. The included soils make up about 10 to 20 percent of this unit.

This soil has low potential for production of crops, but it is limited by the erosion hazard, slope, low natural fertility, and medium available water capacity. Terracing and growing crops that produce large amounts of residue help to control erosion and maintain tilth.

This soil is used mainly for pasture, and it has medium potential for this use. It is well suited to improved bermudagrass, weeping lovegrass, and kleingrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a post oak and blackjack oak savannah and an understory of mid and tall grasses.

This soil has high potential for urban and recreation uses. Low strength is the most restrictive limitation for these uses. Potential for both openland and rangeland wildlife habitats is high. Capability subclass IIIe; Sandy Loam range site.

53—Silawa fine sandy loam, 3 to 8 percent slopes, eroded. This deep, well drained, gently sloping to sloping soil is on ridges and side slopes. It has been damaged by water erosion, and part of the original surface layer has been removed. Many areas are dissected by gullies 1 to 3 feet deep and 75 to 100 feet apart. Mapped areas are 20 to 150 acres in size. Slopes are convex.

This soil has a surface layer of brown, slightly acid fine sandy loam about 9 inches thick. Between depths of 9 and 39 inches is red, medium acid sandy clay loam; and between depths of 39 and 58 inches is reddish yellow, medium acid sandy clay loam. The underlying layer, to a depth of 80 inches, is reddish yellow, strongly acid loamy fine sand.

This soil can be worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is medium. The hazard of water erosion is severe.

Included with this soil in mapping are some soils that have a gravelly sandy clay loam layer between depths of 9 and 58 inches. Also included are a few intermingled areas of Silawa loamy fine sand and Axtell soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has low potential for production of crops, but it is limited for this use by gully erosion, slope, low natural fertility, and medium available water capacity.

This soil is used mainly for pasture, and it has medium potential for this use. It is well suited to improved bermudagrass, weeping lovegrass, and kleingrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a post oak and blackjack oak savannah, and an understory of mid and tall grasses.

This soil has low potential for urban uses. Slopes and gullies are the most restrictive limitations for this use. The potential for recreation is medium. Again, slopes and gullies are the most restrictive limitations. Potential for both openland and rangeland wildlife habitat is high. Capability subclass IVe; Sandy Loam range site.

54—Silstid loamy fine sand, 0 to 3 percent slopes. This deep, well drained, nearly level to gently sloping soil is on ancient stream terraces. Slopes are convex. Areas are mostly oval and range from 20 to 295 acres in size.

This soil has a surface layer of slightly acid loamy fine sand about 26 inches thick. This layer is brown to a depth of 10 inches and pale brown below. Between depths of 26 and 43 inches is brownish yellow, medium acid sandy clay loam that has pale brown and reddish yellow mottles. Between depths of 43 and 56 inches is yellow, medium acid sandy clay loam that has light gray and reddish yellow mottles. The underlying layer, to a depth of 80 inches, is brownish yellow, medium acid sandy clay loam that has reddish yellow mottles.

This soil can be worked throughout a wide range of moisture conditions. Permeability is moderate, and available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazards of soil blowing and water erosion are slight.

Included with this soil in mapping are a few intermingled areas of Chazos, Padina, and Silawa soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by low natural fertility and the medium available water capacity. The only crops grown on this soil are corn and some specialty crops, such as tomatoes and watermelons. The major objectives of management are to conserve moisture and improve fertility. Growing crops that produce large amounts of residue or growing legumes help to maintain tilth.

This soil is used mainly for pasture, and it has medium potential for this use. It is well suited to improved bermudagrass and weeping lovegrass. Proper pasture management includes weed control, controlled grazing, and applications of fertilizer.

This soil has medium potential for range. The climax plant community is an open savannah of post oak and blackjack oak that has an understory of tall and mid grasses.

This soil has high potential for urban uses. Caving cutbanks is the most restrictive limitation. The potential for recreation is low. The sandy surface layer is the most restrictive limitation for this use. Potential for openland wildlife habitat is low, and potential for rangeland wildlife habitat is medium. Capability subclass IIIs; Sandy range site.

55—Stephen silty clay, 1 to 4 percent slopes. This shallow, well drained, gently sloping soil is on upland areas that slope to natural drainageways. Slopes are convex. Areas range from 5 to 75 acres in size.

This soil has a surface layer of dark grayish brown, moderately alkaline silty clay about 15 inches thick. Between depths of 15 and 19 inches is white, platy chalk fragments mixed with dark brown, moderately alkaline silty clay. The underlying material is white, platy chalk.

This soil has good tilth and can be easily worked, but deep plowing often brings up pieces of chalk. Permeability is moderately slow, and the available water capacity is very low. The root zone is restricted by depth to rock. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Austin and Eddy soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by depth to rock and very low available water capacity. The major crops are small grain as well as grain sorghum, cotton, and corn. The objectives of management are controlling erosion and improving fertility and soil tilth. High-residue crops or close-spaced crops assist in maintaining the tilth.

This soil has low potential for pasture. It is well suited to King Ranch bluestem and kleingrass. Proper management includes weed control, fertilization, and controlled grazing.

This soil has low potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of scattered live oak trees, singly or in small motts.

This soil has low potential for urban uses. It is limited by depth to rock. The potential for recreation is low. The clayey surface layer is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Chalky Ridge range site.

56—Tabor fine sandy loam, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is on uplands and high stream terraces. Slopes are plane. Areas range from 10 to about 75 acres in size.

This soil has a surface layer of brown, medium acid fine sandy loam about 12 inches thick. Between depths of 12 and 32 inches is yellowish brown, strongly acid clay that has grayish brown and light gray mottles; and between depths of 32 and 49 inches is brownish yellow, strongly acid clay that has light gray and light yellowish brown mottles. Between depths of 49 and 59 inches is light gray, mildly alkaline clay that has yellow and very pale brown mottles. The underlying layer, to a depth of 70 inches, is white, mildly alkaline clay loam that has yellow mottles.

This soil can be worked throughout a wide range of moisture conditions. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in underlying layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Axtell, Chazos, and Silstid soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use because of low natural fertility and very slow permeability. It was extensively cultivated in the past, but at the time of this survey only a few acres were planted to corn and such specialty crops as tomatoes. The major objectives of management are to improve soil tilth and improve fertility. Growing crops that produce large amounts of residue or growing deep-rooted legumes help maintain tilth.

This soil is used mainly for pasture, and it has high potential for this use. It is well suited to improved bermudagrass, weeping lovegrass, and kleingrass. Proper management includes weed control, controlled grazing, and application of a complete fertilizer.

This soil has high potential for range. The climax plant community is a post oak and blackjack oak savannah and an understory of mid and tall grasses.

This soil has low potential for urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. Occasional wetness and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is high. Capability subclass IIIs; Sandy Loam range site.

57—Tabor fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands and high stream terraces. Slopes are convex. Areas range from 10 to about 100 acres in size.

This soil has a surface layer of fine sandy loam about 12 inches thick. This layer is brown and slightly acid to a depth of 7 inches and pale brown and strongly acid below. Between depths of 12 and 28 inches is brown, strongly acid clay that has grayish brown, brownish yellow, and reddish yellow mottles. Between depths of 28 and 44 inches is yellowish brown, strongly acid clay that has light brownish gray, brownish yellow, brown, and yellowish red mottles; and between depths of 44 and 54 inches is light gray, mildly alkaline clay that has reddish yellow, brown, yellowish red, and red mottles. The underlying layer, to a depth of 70 inches, is mottled brownish yellow, light brownish gray, and yellowish red, mildly alkaline clay.

This soil can be worked throughout a wide range of moisture conditions. Permeability is very slow, and the available water capacity is high. The root zone is deep, but root penetration is slow and difficult in underlying layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Axtell and Chazos soils. The included soils make up 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited by low natural fertility and very slow permeability. It was extensively cultivated in the past, but at the time of this survey only a few acres were planted to corn and specialty crops, such as tomatoes. The major objectives of management are controlling erosion and improving tilth and fertility. Growing crops that produce large amounts of residue or growing deep-rooted legumes and terracing helps maintain tilth and control erosion.

This soil is used mainly for pasture, and it has high potential for this use. It is well suited to improved bermudagrass, weeping lovegrass, and kleingrass. Proper

management includes weed control, controlled grazing, and application of a complete fertilizer.

This soil has high potential for range. The climax plant community is a post oak and blackjack oak savannah and an understory of mid and tall grasses.

This soil has low potential for urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, low strength, slow percolation, and corrosivity to uncoated steel. The potential for recreation is medium. Occasional wetness and very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is high. Capability subclass IIIe; Sandy Loam range site.

58—**Trinity clay, occasionally flooded.** This deep, somewhat poorly drained, nearly level soil is on flood plains of minor streams. It is flooded only once every 4 to 10 years; flooding lasts for several hours. Slopes are plane to slightly concave and range from 0 to 1 percent. Individual areas are in long, narrow bands and range from 10 to about 150 acres in size.

This soil has a surface layer of very dark gray, moderately alkaline clay about 45 inches thick. Between depths of 45 and 61 inches is gray, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is olive gray, moderately alkaline clay.

This soil is difficult to work. It stays wet for long periods after rains. When dry, this soil is extremely hard, and large clods form if it is plowed. Permeability is very slow, and the available water capacity is high. The root zone is deep, but dense plowpan layers that form in cultivated areas restrict the movement of roots. Runoff is very slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Ovan and Gowen soils. Also included are few soils in narrow sloughs that hold floodwaters when the main stream overflows its banks. These included soils make up about 10 to 20 percent of this map unit.

This soil has high potential for production of crops. The major crops are cotton and grain sorghum, and some corn is also grown. The major management objective is to improve tilth. Growing crops that produce large amounts of residue or deep-rooted legumes help maintain the soil tilth.

This soil has medium potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees adjacent to the stream.

This soil has low potential for urban uses. Its most restrictive limitations are wetness, flooding, shrinking and swelling with changes in moisture, and slow percolation. The potential for recreation is low. Wetness, flooding, and the clayey surface layer are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIw; Clayey Bottomland range site.

59—**Trinity clay, frequently flooded.** This deep, somewhat poorly drained, nearly level soil is on flood plains of minor streams. It is flooded two or three times a year; flooding lasts from several hours to one day. These areas have plane to slightly concave slopes of 0 to 1 percent. The areas are in long, narrow bands paralleling the stream channel. Individual areas are 50 to about 500 acres in size.

The soil has a surface layer of dark gray, moderately alkaline clay about 47 inches thick. Between depths of 47 and 67 inches is gray, moderately alkaline clay. The underlying layer, to a depth of 80 inches, is olive gray, moderately alkaline clay.

Permeability is very slow, and available water capacity is high. The root zone is deep, but the clayey material restricts root penetration. Runoff is very slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few areas of Trinity soils that are not flooded annually. Also included are a few intermingled areas of Ovan and Gowen soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has low potential for production of crops, recreation, and urban uses. It is limited for this use by flooding, which can be overcome only by major flood control. The clayey surface layer also restricts some urban and recreation uses.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range production. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, elm, hackberry, cottonwood, and black willow trees adjacent to the stream.

This soil has medium potential for both openland and rangeland wildlife habitat. Capability subclass Vw; Clayey Bottomland range site.

60—**Weswood silt loam, 0 to 1 percent slopes.** This deep, well drained, nearly level soil is on high flood plains of the Brazos River. It is rarely flooded. Areas are long and narrow. They range from 10 to 500 acres in size. Slopes are plane.

This soil has a surface layer of reddish brown, moderately alkaline silt loam about 12 inches thick. Between depths of 12 and 36 inches is reddish brown, moderately alkaline silt loam stratified with light reddish brown fine sandy loam. The underlying layer, to a depth of 60 inches, is light reddish brown, moderately alkaline silt loam and strata of light reddish brown fine sandy loam and fine sand.

This soil is easily worked. Permeability is moderate, and available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small intermingled areas of Yahola and Highbank soils. The included soils make up 15 percent of this map unit.

This soil is used mainly for crops, and it has high potential for this use. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The major objectives of management of this soil are maintaining fertility and improving tilth. Growing crops that produce large amounts of residue or growing deep-rooted legumes help to maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees.

This soil has low potential for urban uses because of the danger of flooding. The potential for recreation is high. Flooding is the most restrictive limitation for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability class I; Loamy Bottomland range site.

61—Weswood silty clay loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on high flood plains of the Brazos River. It is subject to flooding only once in about 4 to 10 years and then only for a short duration. Slopes are plane. Areas are long and narrow, and they range from 15 to 200 acres in size.

This soil has a surface layer of reddish brown, moderately alkaline silty clay loam about 6 inches thick. The subsoil, to a depth of 18 inches, is reddish brown, moderately alkaline silty clay loam. Between depths of 18 and 38 inches is stratified reddish brown silty clay loam and yellowish red clay loam. The underlying layer, to a depth of 60 inches, is reddish brown, moderately alkaline silty clay loam and thin layers of very fine sandy loam and silt loam.

This soil is easily worked, although crusts form on the surface. Permeability is moderate, and the available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small intermingled areas of Weswood silt loam and Yahola soils. The included soils make up about 14 percent of this map unit.

This soil is used mainly for crops, and it has high potential for this use. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The major objectives of management are maintaining tilth and fertility. Growing crops that produce large amounts of residue or growing legumes helps maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees.

This soil has low potential for urban uses, because of the danger of flooding. The potential for recreation is medium. The silty clay loam surface layer is the most restrictive limitation for this use. Potential for openland wildlife habitat is high, and potential for rangeland wildlife habitat is medium. Capability class I; Loamy Bottomland range site.

62—Weswood complex, 0 to 8 percent slopes. This map unit consists of deep, well drained, nearly level to sloping soils that are on the beveled edges and bottoms of natural secondary drainageways in the high flood plain of the Brazos River. The Weswood soils rarely flood. Slopes are plane to convex. Areas are long and narrow in shape and range from 40 to 100 acres in size.

A typical area of this map unit is about 66 percent Weswood soil and 34 percent other soils. These soils are so intricately mixed that separation is not practical at the scale they were mapped.

The Weswood soil has a surface layer of reddish brown, moderately alkaline silty clay loam about 9 inches thick. Between depths of 9 and 18 inches is reddish brown, moderately alkaline silty clay loam. The underlying layer, to a depth of 60 inches, is reddish brown, moderately alkaline silty clay loam stratified with reddish brown fine sandy loam and reddish brown silty clay.

This soil is easily worked, although crusts form on the surface. Permeability is moderate, and the available water capacity is high. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is severe where slopes are more than about 3 percent.

Other soils included in mapping include areas of Roetex and Yahola soils and minor areas of Trinity and Ships soils. These soils are frequently flooded. They are on more nearly level and lower parts of the landscape.

These soils have low potential for crops. They are limited by slope, erosion, and danger of flooding.

Potential for pasture is high. Improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass are grass species well suited to this soil. Proper pasture management includes fertilization, weed control, and controlled grazing.

These soils have high potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees.

These soils have low potential for urban use. The danger of flooding is a limitation for this use. The potential for recreation is medium. Flooding and slope are the most restrictive limitations. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IVe; Loamy Bottomland range site.

63—Wilson loam, 0 to 1 percent slopes. This deep, somewhat poorly drained, nearly level soil is on uplands and terraces. Slopes are plane. Areas range from 15 to 120 acres in size.

This soil has a surface layer of dark grayish brown, slightly acid loam about 6 inches thick. Between depths of

6 and 32 inches is dark gray, neutral clay loam. Between depths of 32 and 60 inches is gray, mildly alkaline clay loam that has brown mottles in the lower part. The underlying layer, to a depth of 80 inches, is light olive gray, moderately alkaline clay loam that has light gray and light brownish gray mottles.

The soil is difficult to work because of dense plowpan layers that form in cultivated areas. Permeability is very slow, and the available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Wilson silty clay loam and Crockett soils. The included soils make up 10 to 20 percent of these areas.

This soil has medium potential for production of crops. The major crops are grain sorghum, cotton, hay, and some small grain for winter grazing. The objectives of management are improving tilth and maintaining fertility. Growing crops that produce large amounts of residue and legumes helps maintain tilth.

This soil has medium potential for pasture. It is well suited to coastal bermudagrass, King Ranch bluestem, and weeping lovegrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, occasional wetness, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. Wetness and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIw; Claypan Prairie range site.

64—Wilson loam, 1 to 3 percent slopes. This deep, somewhat poorly drained, gently sloping soil is on uplands and terraces. Slopes are plane or slightly concave. Areas range from 15 to 200 acres in size.

This soil has a surface layer of dark grayish brown, slightly acid loam about 6 inches thick. Between depths of 6 and 22 inches is dark gray, neutral silty clay. Between depths of 22 and 39 inches is gray, mildly alkaline silty clay. Between depths of 39 and 64 inches is light brownish gray, moderately alkaline silty clay that has yellowish brown mottles. The underlying layer, to a depth of 80 inches, is light olive gray, moderately alkaline silty clay that has yellow and strong brown mottles.

This soil is difficult to work because of dense plowpan layers that form in cultivated areas. Permeability is very slow, and the available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Wilson silty clay loam and Crockett soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited by surface crusting and rapid loss of soil moisture during the summer. The major crops are grain sorghum, cotton, and small grain for winter grazing. The major objectives of management are controlling erosion, maintaining fertility, and improving tilth. Growing crops that produce large amounts of residue or growing deep-rooted legumes helps control erosion and maintain the soil tilth.

This soil has medium potential for pasture. It is well suited to coastal bermudagrass, King Ranch bluestem, and weeping lovegrass. Proper management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, occasional wetness, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. Occasional wetness and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Claypan Prairie range site.

65—Wilson silty clay loam, 0 to 1 percent slopes. This deep, somewhat poorly drained, nearly level soil is on uplands and ancient stream terraces. Slopes are plane. Areas range from 20 to 200 acres in size.

This soil has a surface layer of dark gray, mildly alkaline silty clay loam about 6 inches thick. Below the surface layer, to a depth of 25 inches, is dark gray, mildly alkaline clay. Between depths of 25 and 39 inches is gray, mildly alkaline clay. Below this layer, to a depth of 58 inches, is light gray, moderately alkaline clay that has light yellowish brown mottles. The underlying layer, to a depth of 80 inches, is light olive gray, moderately alkaline clay that has yellowish brown mottles (fig. 10).

This soil is difficult to work because of surface crusts and dense plowpan layers that form in cultivated areas. When dry, this soil is extremely hard; when wet, it is sticky and plastic. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are a few intermingled areas of Burleson, Crockett, and Normangee soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops. The major crops are grain sorghum, cotton, hay, and some small grain for winter grazing. The objectives of management are improving tilth and maintaining fertility. Grow-

ing crops that produce large amounts of residue and legumes helps maintain tilth.

This soil has medium potential for pasture. It is well suited to coastal bermudagrass, King Ranch bluestem, and weeping lovegrass. Pasture management needed includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams and in occasional motts.

This soil has low potential for most urban uses. Its most restrictive limitation is shrinking and swelling with changes in moisture, occasional wetness, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. Wetness and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIw; Claypan Prairie range site.

66—Wilson silty clay loam, 1 to 3 percent slopes. This deep, somewhat poorly drained, gently sloping soil is on uplands and ancient stream terraces. Slopes are plane or slightly concave. Areas range from 15 to 150 acres in size.

The soil has a surface layer of very dark gray, mildly alkaline silty clay loam about 6 inches thick. Below the surface, to a depth of 28 inches, is dark gray, mildly alkaline clay. Between depths of 28 and 55 inches is gray, mildly alkaline clay. The underlying layer, to a depth of 80 inches, is light brownish gray, moderately alkaline clay that has brownish yellow mottles.

This soil is difficult to work because of surface crusts and dense plowpan layers that form in cultivated areas. When dry, this soil is extremely hard; when wet, it is sticky and gummy. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is medium. The hazard of water erosion is moderate.

Included with this soil in mapping are a few intermingled areas of Burleson, Crockett, and Normangee soils. Also included are a few areas of eroded Wilson soils. The included soils make up about 10 to 20 percent of this map unit.

This soil has medium potential for production of crops, but it is limited for this use by surface crusting and rapid loss of soil moisture during the summer. The major crops are grain sorghum, cotton, and small grain for winter grazing. The major objectives of management are controlling erosion, maintaining fertility, and improving tilth. Growing crops that produce large amounts of residue or growing deep-rooted legumes help to control erosion and maintain tilth.

This soil has medium potential for pasture. It is well suited to coastal bermudagrass, King Ranch bluestem, and weeping lovegrass. Needed pasture management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams and occasionally in motts.

This soil has low potential for most urban uses. Its most restrictive limitations are shrinking and swelling with changes in moisture, occasional wetness, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. Occasional wetness and the very slow permeability are the most restrictive limitations for this use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IIIe; Claypan Prairie range site.

67—Wilson silty clay loam, 2 to 5 percent slopes, eroded. This deep, somewhat poorly drained, gently sloping soil is on uplands and ancient stream terraces. Slopes are convex or plane. Areas are in long narrow bands, and the soil slopes to natural drainageways. Part of the original surface layer has been removed by water erosion, and many areas are dissected by gullies about 1 to 2 feet deep and 75 to 100 feet apart. Individual soil areas range from 20 to 175 acres in size.

This soil has a surface layer of dark grayish brown, mildly alkaline silty clay loam about 4 inches thick. Below the surface layer, to a depth of 28 inches, is dark gray, mildly alkaline clay. Between depths of 28 and 62 inches is gray, mildly alkaline clay. The underlying layer, to a depth of 80 inches, is very pale brown, moderately alkaline clay that has yellow mottles.

This soil is difficult to work. When dry, it is extremely hard; when wet, it is sticky and gummy. Surface crusts and dense plowpans form in cultivated areas. Permeability is very slow, and available water capacity is high. The root zone is deep, but root penetration is slow and difficult in the underlying layers. Runoff is medium. The hazard of water erosion is severe.

Included with this soil in mapping are a few intermingled areas of Crockett and Burleson soils. The included soils make up less than 20 percent of this map unit.

This soil has medium potential for production of crops. The major crops are grain sorghum, cotton, and corn. The objectives of management are controlling erosion and maintaining tilth and fertility. Terracing and growing crops that produce large amounts of residue or deep-rooted legumes help control erosion and maintain tilth.

This soil has medium potential for pasture. It is well suited to coastal bermudagrass, King Ranch bluestem, and weeping lovegrass. Pasture management needed includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of a few live oak, elm, and hackberry trees along streams or occasionally in motts.

This soil has low potential for most urban uses. The most restrictive limitations are the presence of gullies, shrinking and swelling with changes in moisture, occasional wetness, low strength, corrosivity to uncoated steel, and slow percolation. The potential for recreation is medium. Gullies, occasional wetness, and the very slow permeability are the most restrictive limitations for this

use. Potential for both openland and rangeland wildlife habitat is medium. Capability subclass IVe; Claypan Prairie range site.

68—Yahola fine sandy loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains of the Brazos River. It is flooded only once every 4 to 10 years; flooding lasts for several hours. Slopes are 0 to 1 percent and plane. Areas are long, narrow bands paralleling the river. Some areas are smooth, and others are channeled by shallow drainageways. These areas range from 10 to 110 acres in size.

This soil has a surface layer of reddish brown, moderately alkaline fine sandy loam about 10 inches thick. Below the surface layer, to a depth of 37 inches, is reddish yellow, moderately alkaline fine sandy loam. Between depths of 37 and 58 inches is reddish brown, moderately alkaline loam. The underlying layer, to a depth of 80 inches, is yellowish red, moderately alkaline fine sandy loam and thin strata of loamy fine sand and clay loam.

This soil is easily worked, although crusts form on the surface. Permeability is moderately rapid, and the available water capacity is medium. The root zone is deep and easily penetrated by roots. Runoff is slow. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Weswood and Gaddy soils. The Weswood soils are at higher elevations on the flood plain, and the Gaddy soils are parallel to the stream channel. The included soils make up 10 percent of this map unit.

This soil is used mainly for crops, and it has high potential for this use. The major crops are cotton and grain sorghum, but corn and small grain are also grown. The major objectives of management are maintaining fertility and improving tilth. Growing crops that produce large amounts of residue or growing legumes helps to maintain tilth.

This soil has high potential for pasture. It is well suited to improved bermudagrass, common bermudagrass, johnsongrass, and kleingrass. Proper pasture management includes fertilization, weed control, and controlled grazing.

This soil has medium potential for range. The climax plant community is a mixture of tall and mid grasses and an overstory of oak, pecan, hackberry, elm, cottonwood, and black willow trees.

This soil has low potential for urban uses. It is limited by the danger of flooding. The potential for recreation is medium. Flooding is the most restrictive limitation for this use. Potential for both openland and rangeland wildlife habitat is high. Capability subclass IIw; Loamy Bottomland range site.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture; rangeland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners,

conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

More than 435,342 acres in the survey area was used for crops, pasture, and range in 1967, according to the Conservation Needs Inventory, Texas, 1970 (*5*). Of this total 112,957 acres was used for permanent pasture; 26,001 acres for range; 143,014 acres for row crops, mainly cotton and grain sorghum; 89,382 acres for close-grown crops, mainly wheat and oats; and the rest was idle cropland.

The potential of the soils in Falls County for increased production of food is good. About 96,000 acres of potentially good cropland is currently used as pasture, about 15,000 acres as range, and 13,000 acres as noncommercial forest. In addition to the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

Acreage in crops gradually has been decreasing, and acreage in pasture and range has increased. Urban and built-up land has been increasing at a very slow rate in the county. This soil survey can be used to help make land-use decisions that will influence the future role of farming in the county (see the section "General soil map for broad land-use planning").

Water erosion is the major soil problem on about two-thirds of the cropland and pasture in Falls County. If the slope is more than 2 percent, water erosion is a hazard. Altoga, Austin, Heiden, Ferris-Heiden, and Lewisville soils, for example, slope from 3 to 5 percent or more in some areas.

Loss of the surface layer by erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging to soils that have a clayey subsoil, such as Axtell, Crockett, and Wilson soils, and to soils that have a layer in or below the subsoil that limits the depth of the root zone. Austin, Eddy, and Stephen soils, for example, have bedrock at shallow depths. Erosion also reduces productivity of soils that tend to be droughty, such as Satin and Normangee. Second, erosion of farmland results in sediment entering streams. Controlling erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, recreation, and fish and wildlife.

In many sloping fields, preparing a good seedbed and tilling are difficult on clayey or plowpan spots because the original friable surface layer has been eroded away. Such spots are common in areas of moderately eroded Lott and Axtell soils.

The results of effective erosion control practices are a protective surface cover, a reduced amount of runoff, and an increased rate of infiltration. A cropping system that keeps vegetative cover on the soil for extended periods holds soil losses to amounts that maintain the productive capacity. On livestock farms, which require pasture and hay, forage crops of legumes and grasses in the cropping system reduce the amount of erosion on sloping land, provide nitrogen, and improve tilth for the following crop.

Slopes are so short and irregular that contour tillage or terracing is not practical in most areas of the strongly sloping Altoga and Ferris-Heiden soils. On these soils, cropping systems that provide substantial vegetative cover are required to control erosion, unless minimum tillage is practiced. Minimum tillage practices and leaving crop residue on the surface help to increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area, but are more difficult to use successfully on the eroded soils and on soils that have a clayey surface layer.

Terraces and diversions reduce the length of slope and help to control runoff and erosion. They are most practical on deep, well drained soils that have regular slopes. Altoga, Austin, Branyon, Burleson, Heiden, Houston Black, Lewisville, and Lott soils are suitable for terraces. The other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in the terrace channels, a clayey subsoil that would be exposed in terrace channels, bedrock at a depth of less than 40 inches, or flooding.

Use of contour farming and terraces are widespread erosion-control practices in the survey area. These practices are best adapted to soils that have smooth, uniform slopes, including most Heiden, Houston Black, Burleson, and Lewisville soils.

Soil blowing is a hazard on the sandy Silstid, Padina, Chazos, and Desan soils and Silawa loamy fine sand. In a few hours, strong winds can damage these soils if they are dry and lack vegetation or surface mulch. Maintaining vegetation cover, surface mulch, or rough surfaces by proper tillage helps minimize soil blowing.

Information on erosion control practices for each kind of soil can be obtained at the local offices of the Soil Conservation Service.

Drainage is not a problem on most soils of the county. Roetex, Trinity, and Wilson are the only somewhat poorly drained soils. Unless these soils are artificially drained, wetness may damage crops in some years.

Branyon, Burleson, and Houston Black soils have good natural drainage most of the year, but they tend to dry out slowly after rains. Small areas of wetter soils are along drainageways and in swales in areas of the moderately well drained Ships and Ovan soils. Information on drainage design for each kind of soil is available at local offices of the Soil Conservation Service.

Fertility is naturally high in most soils on flood plains, such as Highbank, Ovan, Roetex, Ships, Trinity, Gaddy, and Weswood. Many of the mildly alkaline to moderately

alkaline soils on uplands, such as Branyon, Heiden, Houston Black, Lewisville, and Lott soils are also high in natural fertility. Altoga, Austin, Burleson, Ferris, and Wilson soils are mildly alkaline to moderately alkaline on uplands. Their natural fertility is low to medium. The slightly acid Chazos, Desan, Normangee, Silawa, and Silstid soils and the medium acid to strongly acid Axtell, Bastrop, Crockett, Padina, and Tabor soils are low in natural fertility.

The mildly alkaline to moderately alkaline soils of the county require applications of a complete fertilizer. The slightly acid to strongly acid soils need a split application of a complete fertilizer to keep soil moisture and fertility in balance and prevent loss of nutrients by leaching. On all soils, additions of fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kind and amount of fertilizer to apply.

Soil tilth is an important factor in germination of seeds and in infiltration of water into the soil. Soils that have good tilth are granular and porous.

Most soils used for crops in the survey area have a dark clay or silty clay surface layer and have a medium to high content of organic matter. Generally such soils have moderate structure. They are difficult to work because they are sticky when wet and extremely hard when dry. Good seedbeds are difficult to prepare. If plowed when wet, these soils then tend to be very cloddy when dry. Dense plovpans gorm in cultivatdd soils and impede the downward movement of plant roots. Fall plowing generally provides good tilth for spring use.

Fall plowing is generally not a good practice on the light-colored soils that have a silt loam, silty clay loam, clay loam, or fine sandy loam surface layer. A crust forms on these soils during winter and spring. The crust is hard when dry, and it is nearly impervious to water. Once formed, the crust reduces the rate of infiltration and increases the amount of runoff. Regular additions of crop residue, manure, and other organic material help reduce crust formation and improve soil structure.

Field crops suited to the soils and climate of the survey area include cotton, grain sorghum, and corn.

Wheat and oats are the common close-growing crops. Alfalfa is also grown to a lesser extent. Grass seed can be produced from kleingrass, weeping lovegrass, or King Ranch bluestem.

Special crops are grown commercially along both sides of the Brazos River. These crops include melons, tomatoes, and other vegetables. The soils in these areas can be adapted to other special crops, such as strawberries, blackberries, peaches, pecans, and many other vegetables (fig. 11).

The deep, loamy soils that have slopes of less than 6 percent have good natural drainage, and they warm up early in spring. They are especially well suited to many vegetables and small fruits. In the survey area these soils are the Silawa, Silstid, Chazos, Padina, Axtell, and Tabor. Their total acreage is about 27,000 acres. Crops generally can be planted and harvested earlier on all these soils than on the other soils in the survey area. Soils at low elevations, where frost is frequent and air drainage is poor, however, generally are poorly suited to early vegetables, small fruits, and orchards.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. A few farmers may be obtaining average yields higher than those shown in table 4.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 4 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops.

The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 5. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Rangeland

HERBERT H. SENNE, JR., range conservationist, Soil Conservation Service, helped write this section.

About 5 percent of Falls County can be classified as rangeland, based on the kinds and diversification of plants. Few ranchers depend exclusively on rangeland to feed livestock. Range vegetation often contributes significant amounts of forage during winter months, but it is supplemented by protein concentrate and small grain.

Native vegetation in most of the county is found only in small blocks of less than 100 acres. These blocks of rangeland, for the most part, have been greatly depleted in forage productivity because of improper grazing management and invasion of woody or weedy vegetation which further reduces range forage yields. The amount of forage produced on these lands is generally less than half of that originally produced.

Production of vegetation can be increased by using management practices that are effective for specific kinds of soils and range sites.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 6 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community that is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 6.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction is also important.

Potential production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant

community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Common plant names of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Some decisions for the planning and application of range management practices require, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The western part of Falls County is dominantly clayey soils. These soils have potential to support tall grasses and a climax plant community that is dominantly tall grass prairie. Interspersed areas of trees occur frequently along major drainageways and occasionally in motts. Most of the eastern part of the county is loamy and sandy soils. The climax plant community generally is a post oak, blackjack oak savannah. Trees shade as much as 15 to 20 percent of the ground on uplands. Such large trees as oaks, American elm, and hackberry form a dense overstory along major drainageways and major tributaries. Mid and tall grasses dominate the understory.

The major concern when managing rangeland is that of controlling grazing so that the kinds and amounts of plants that make up the potential plant community will be reestablished or improved. Controlling erosion is also an important management concern. The potential for increasing the productivity of range in the area is good if sound range management practices are used, information available in the soil survey is applied, and knowledge procured from rangeland inventories is used.

Engineering

HUGH A. SMITH, engineer, Soil Conservation Service, assisted in writing this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on

which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, and shrink-swell potential are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and

limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is solid waste (refuse) and soil material that is placed in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The

performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitabili-

ty of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

Many farmers and ranchers in Falls County use the soils for wildlife habitat. Much of the acreage of the county is in native vegetation, in tame pasture grasses, or in idle cropland that is no longer cropped on a regular basis. These areas are suited to one or more species of wildlife. Some areas support potentially higher population densities than others. Regularly cropped areas provide seasonal food and cover for various kinds of wildlife.

In recent years major wildlife species have increased. Some of the wildlife found in varying populations in Falls County are rabbits, squirrels, skunks, opossums, coyotes, foxes, raccoons, white-tailed deer, and armadillos. Birds include doves, quail, ducks, and various songbirds. Largemouth bass, channel catfish, and redear sunfish are suitable for stocking farm ponds and lakes. They are abundant in many of the farm ponds.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, barley, cowpeas, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, wintergreen hardinggrass, lovegrass, switchgrass, kleingrass, indiangrass, clover, alfalfa, and vetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, burclover, partridgepea, dewberry, purpletop tridens, and sensitive brier.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are hackberry, redhaw, yaupon, possumhaw, and greenbrier.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wild rice, button willow, reedgrass, and indigobush, and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are waterfowl feeding areas and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, cottontail rabbit, and red fox.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, and beaver.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include white-tailed deer, quail, rabbits, meadowlarks, raccoons, squirrels, skunks, coyotes, and foxes.

Gardening and landscaping

Homeowners who plan to landscape their yards need to identify the soil or soils and determine what flowers, shrubs, and trees are best suited to these soils. In some areas plants may be needed for erosion control as well as for aesthetic purposes.

Soils well suited to yard and garden plants are those that have a deep root zone, a loamy texture, a balanced supply of plant nutrients, plenty of organic matter in various stages of decomposition, an adequate available water capacity, good drainage, and granular structure that allows free movement of water, air, and roots. The degree of acidity or alkalinity suitable for the particular plants is also important. For example, roses and most annual flowers, most vegetables, and most grasses generally grow better in soils that are noncalcareous and are neutral or only slightly acid in reaction. Azaleas, camellias, and similar plants need acid soils. Some plants in soils that have a high content of lime, such as the Houston Black soils, develop a condition called "chlorosis," or yellowing of the leaves. Many flowers, shrubs, and trees in Fall County, however, are well suited to the limy

(calcareous) soils. Some of these flowers are shasta daisies, hollyhocks, petunias, zinnias, and gladioli. Some of the shrubs and trees are crapemyrtle, duranta, elm, and live oak.

Table 13 lists some of the flowers, shrubs, and trees suitable for the soils in Falls County.

Some of the plants are native to Falls County. For lists of additional plants suitable for soils of Falls County consult your local nurseryman or County Extension Horticulturist.

The first column in table 13 lists all soils and map symbols of Falls County. The second lists the more common flowers adapted to each soil. The remaining two columns list the most common shrubs and trees for each soil. For information on soil texture, drainage, permeability, structure and other characteristics, see the map unit description in the section "Soil maps for detailed planning" and the series description in "Soil series and morphology." Soil reaction (pH), permeability, and available water capacity are presented in table 15.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, and engineering test data.

Engineering properties and classifications

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index num-

bers in parentheses, is given in table 17. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Engineering test data

Table 17 contains the results of engineering tests performed by the Texas Highway Department on some of the soils in Falls County. The table shows the depth to which sampling was done and the results of tests to determine particle-size distribution and other properties significant in soil engineering.

As moisture is removed from a soil, the soil shrinks and decreases in volume in direct proportion to the loss in moisture until a condition of equilibrium, called the *shrinkage limit*, is reached. At this point shrinkage stops, although additional moisture is removed. Shrinkage limit is reported as the percentage of moisture in ovendry soil.

Lineal shrinkage is the decrease in one dimension of the soil mass when the moisture content is reduced from the liquid limit to the shrinkage limit (*3*). It is expressed as a percentage of the original dimension.

Shrinkage ratio is computed by dividing the amount of volume change that results from the drying of soil material by the amount of moisture lost by drying. It is expressed numerically.

Mechanical analysis indicates the percentages, by weight, of soil particles that pass sieves of specified sizes. Sand and other coarser materials do not pass the No. 200 sieve, as do the finer silt and clay particles.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from solid to plastic. If the moisture content is further increased, the material changes from plastic to liquid. The plastic limit is the moisture content at which the soil material passes from solid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Classification of the soils

The soil series of the survey area are described in this section, the current system of classifying soils is defined, and the soils of the area are classified according to that system (table 18).

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*6*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Aledo series

The Aledo series consists of dark grayish brown soils that formed in material weathered from indurated limestone. The Aledo soils are on uplands. Slopes are convex and range from 1 to 5 percent.

Typical pedon of Aledo fine sandy loam in an area of Aledo soils, 1 to 5 percent slopes; from the intersection of Texas Highway 6 and Texas Highway 7 in Marlin, 11.0 miles east on Texas Highway 7, 2.7 miles north on Farm Road 1771, and 100 feet west in pasture.

A11—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; 10 percent by volume limestone pebbles 1/8 to 1 inch in diameter; calcium carbonate equivalent is 30 percent; calcareous; moderately alkaline; clear irregular boundary.

A12—5 to 10 inches; dark grayish brown (10YR 4/2) very gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; about 60 percent by volume limestone fragments, mostly less than 5 inches in diameter; calcium carbonate equivalent is 69 percent; calcareous; moderately alkaline; abrupt wavy boundary.

R—10 to 12 inches; indurated limestone.

Thickness of the soil to indurated limestone is 8 to 12 inches. Average content of limestone fragments in the solum ranges from 40 to 75 percent. The A11 horizon is 5 to 50 percent limestone fragments, and the A12 horizon is 45 to 75 percent. The A horizon is very dark grayish brown or dark grayish brown. The A11 horizon is fine sandy loam or loam. The A12 horizon is very gravelly fine sandy loam or very gravelly loam.

Altoga series

The Altoga series consists of pale brown soils that formed in calcareous marls. The Altoga soils are on broad ridgetops, beveled edges of old high terraces, and foot slopes. Slopes range from 1 to 12 percent.

Typical pedon of Altoga silty clay in an area of Altoga soils, 5 to 12 percent slopes, eroded; from the intersection of Farm Road 1239 and Interstate Highway 35 in Eddy, 3.6 miles southeast on Farm Road 1239, northeast 1.2 miles, southeast 0.4 mile on a county road, and 1,200 feet east of road in a cultivated field:

A1—0 to 5 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; weak fine subangular blocky structure and granular structure; hard, firm; common very fine to fine roots; common fine pores; calcareous; moderately alkaline; gradual smooth boundary.

B2—5 to 25 inches; very pale brown (10YR 7/3) silty clay, pale brown (10YR 6/3) moist; ped exteriors slightly darker before being crushed; common fine faint brownish yellow mottles; moderate fine subangular blocky structure; hard, firm; common fine roots; calcareous; moderately alkaline; gradual smooth boundary.

B3ca—25 to 40 inches; very pale brown (10YR 7/3) silty clay, pale brown (10YR 6/3) moist; common fine faint brownish yellow mottles; moderate fine subangular blocky structure; hard, firm; about 5 percent by volume soft bodies and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

C—40 to 80 inches; very pale brown (10YR 7/3) silty clay, pale brown (10YR 6/3) moist; common medium faint light brownish gray (10YR 6/2) mottles; massive; hard, firm; about 3 percent by volume soft bodies and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline.

The solum ranges from 35 to 42 inches in thickness. Soft powdery forms of calcium carbonate begin at a depth of 15 to 28 inches. The A horizon is grayish brown, light brownish gray, brown, pale brown, or light yellowish brown. The B and C horizons are light brownish gray, light gray, pale brown, very pale brown, light yellowish brown, or light olive brown. These horizons are silty clay, silty clay loam, or clay loam.

Austin series

The Austin series consists of dark grayish brown soils that formed in material weathered from chalky limestone. The Austin soils are on tops and sides of broad ridges. Slopes range from 1 to 5 percent.

Typical pedon of Austin silty clay, 1 to 3 percent slopes, from the intersection of Interstate Highway 35 and Farm Road 107 in Eddy, 1.3 miles south on Interstate Highway 35, 0.3 mile southwest on paved county road, and 27 feet east of road in a cultivated field:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; hard, friable; few fine roots; common very fine to fine pores; few snail shell fragments; calcareous; moderately alkaline; clear smooth boundary.

A1—6 to 17 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure and granular structure; hard, firm; common fine roots; common very fine to fine pores; few fragments of chalky limestone 1/8 to 1 inch in diameter; calcareous; moderately alkaline; gradual smooth boundary.

B21—17 to 27 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, firm; few fine roots; common fine pores; few fragments of chalky limestone 1/8 inch to 2 inches in diameter; calcareous; moderately alkaline; clear smooth boundary.

B22—27 to 29 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, firm; few fine roots; about 30 percent by volume of platy fragments of chalky limestone less than 6 inches in diameter (long axis); calcareous; moderately alkaline; clear irregular boundary.

C—29 to 35 inches; white (10YR 8/1) platy chalky limestone that has a hardness of less than 3 on the Moh's scale; few thin tongues of brown silty clay in crevices between plates.

The solum ranges from 20 to 40 inches to chalky limestone. The A horizon is dark grayish brown or brown. The B horizon is brown, pale brown, very pale brown, or light yellowish brown silty clay or silty clay loam. The C horizon is platy chalky limestone or interbedded chalk and marl.

Axtell series

The Axtell series consists of dark brown soils that formed in alkaline clayey and loamy sediment. Axtell soils are on broad ridgetops of uplands and on old stream terraces. Slopes range from 0 to 8 percent.

Typical pedon of Axtell fine sandy loam, 1 to 3 percent slopes; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, about 6.5 miles northeast on Farm Road 413, 4.0 miles south on Farm Road 2413, 1.0 mile northeast on county road, 0.3 mile southeast on second county road, and 200 feet northeast in pasture:

A1—0 to 4 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; very hard, friable; many very fine to fine roots; slightly acid; clear smooth boundary.

A2—4 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; very hard, friable; many very fine to fine roots; slightly acid; abrupt wavy boundary.

B21t—9 to 19 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; common medium prominent weak red (2.5YR 5/2), few medium distinct light yellowish brown (10YR 6/4), and few fine distinct light brownish gray mottles; moderate medium blocky structure; extremely hard, very firm; common very fine to fine roots mainly between peds; few very fine pores; distinct clay films on peds; few vertical streaks of lighter colored soil; strongly acid; gradual wavy boundary.

B22t—19 to 34 inches; brownish yellow (10YR 6/8) clay, yellowish brown (10YR 5/8) moist; few fine faint light brownish gray mottles; moderate medium and coarse blocky structure; extremely hard, very firm; few very fine roots; few very fine pores; thin clay films on peds; few shiny pressure faces; few vertical streaks of darker soil; slightly acid; gradual wavy boundary.

B3—34 to 50 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; common medium distinct yellow (10YR 7/8), common medium prominent yellowish red (5YR 5/8), and few fine faint light gray mottles; weak coarse blocky structure; extremely hard, very firm; few thin clay films on peds; moderately alkaline; gradual smooth boundary.

C—50 to 80 inches; brownish yellow (10YR 6/8) sandy clay loam, yellowish brown (10YR 5/8) moist; common medium faint yellow (10YR 8/8), common medium distinct yellowish red (5YR 5/6), and few medium faint very pale brown (10YR 7/3) mottles; massive; very hard, very firm; few horizontal cleavage planes; moderately alkaline.

The solum is 50 to 61 inches thick. The A horizon ranges from 4 to 12 inches thick. Reaction in this horizon is medium acid or slightly acid. The A1 horizon is dark brown, grayish brown, or pale brown. The A2 horizon is brown, yellowish brown, pale brown, light brownish gray, or very pale brown. The B2t horizon is clay or clay loam. The B21t horizon is reddish brown, yellowish red, light reddish brown, red, brown, or reddish yellow and has various sizes and amounts of reddish, yellowish, brownish, or grayish mottles. It is very strongly acid or strongly acid. The B22t and B3 horizons are reddish brown, light reddish brown, red, yellowish red, reddish yellow, brown, pale brown, yellowish brown, light yellowish brown, brownish yellow, or yellow. They have various amounts of reddish, yellowish, brownish, or grayish mottles. The B22t horizon is medium acid or slightly acid. The B3 horizon is clay, clay loam, or sandy clay loam. The C horizon is strong brown, reddish yellow, light yellowish brown, brownish yellow, very pale brown, or yellow sandy clay loam or clay loam. It has various sizes and amounts of reddish, brownish, yellowish, or grayish mottles. The B3 and C horizons are mildly alkaline or moderately alkaline.

Bastrop series

The Bastrop series consists of brown soils that formed in beds of loamy sediment on low terraces above flood plains. Slopes are 0 to 1 percent.

Typical pedon of Bastrop fine sandy loam; from the intersection of Texas Highway 6 and Farm Road 1240 in Perry, about 1.8 miles north on Texas Highway 6, 4.3 miles southwest and 0.8 mile north on county road, and 1,000 feet west in gravel pit:

A1—0 to 11 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; hard, friable; common fine roots; common fine pores; few fine siliceous pebbles; medium acid; clear smooth boundary.

B21t—11 to 15 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, friable; common fine roots; common fine pores; few fine siliceous pebbles; slightly acid; clear smooth boundary.

B22t—15 to 39 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few very fine roots; common fine pores; few patchy clay films in pores and on ped faces; few fine siliceous pebbles; slightly acid; clear smooth boundary.

B23t—39 to 51 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; clay films on ped faces; few fine black concretions; few fine siliceous pebbles; slightly acid; gradual wavy boundary.

B24t—51 to 67 inches; red (2.5YR 5/6) gravelly sandy clay loam, red (2.5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few fine pores; few fine clay films on ped faces; about 25 percent by volume fine and medium siliceous pebbles; slightly acid; gradual smooth boundary.

B3—67 to 75 inches; red (2.5YR 4/6) very gravelly sandy clay loam, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; hard, friable; 55 percent by volume fine and medium siliceous pebbles; slightly acid; diffuse smooth boundary.

C—75 to 80 inches; red (2.5YR 5/6) very gravelly loamy fine sand, red (2.5YR 4/6) moist; massive; hard, friable; 60 percent by volume fine and medium siliceous pebbles; slightly acid.

The A horizon ranges from 11 to 18 inches in thickness. It is pale brown, brown, or yellowish brown. Reaction is medium acid or slightly acid. The B2t horizon is red, reddish brown, yellowish red, or reddish yellow. It is slightly acid or neutral sandy clay loam or gravelly sandy clay loam that increases in gravel content with depth. The B3 horizon is red, yellowish red, or reddish yellow fine sandy loam or very gravelly sandy clay loam. The C horizon is red, yellowish red, or reddish yellow gravelly sandy clay loam, loamy fine sand, or very gravelly loamy fine sand.

The gravel content below 50 inches is higher than is typical for the Bastrop soils, but this does not significantly affect the use and management of these soils for most purposes.

Blum Variant

The Blum Variant soils are dark brown. They formed in material weathered from indurated limestone. Slopes range from 1 to 3 percent. The Blum Variant soils generally have limestone at a depth of 38 inches, which is beyond the range for the Blum series; therefore, these

soils are considered moderately deep variants of the Blum series. Interpretations are based on moderately deep soil.

Typical pedon of Blum Variant fine sandy loam, 1 to 3 percent slopes; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, 6.2 miles northeast on Farm Road 413, 0.8 mile north on Farm Road 1771, north on county road until it runs into a private road, then 0.3 mile on the private road, and 50 feet north in pasture:

A11—0 to 11 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; few worm casts; neutral; clear smooth boundary.

A12—11 to 15 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; few worm casts; neutral; abrupt wavy boundary.

B21t—15 to 20 inches; mottled grayish brown (10YR 5/2), yellowish red (5YR 5/6), and brownish yellow (10YR 6/8) sandy clay loam; weak fine and medium subangular blocky structure; very hard, firm; few fine roots; few fine pores; few black concretions; neutral; gradual smooth boundary.

B22t—20 to 32 inches; mottled grayish brown (10YR 5/2), brownish yellow (10YR 6/8), and yellowish red (5YR 5/8) clay; moderate medium blocky structure; extremely hard, very firm; few fine roots; few medium black concretions; few clay films on ped faces; slightly acid; gradual smooth boundary.

B23t—32 to 38 inches; mottled grayish brown (10YR 5/2), brownish yellow (10YR 6/8), and yellowish red (5YR 5/8) clay; moderate medium blocky structure; extremely hard, very firm; few calcium carbonate concretions; common fine black concretions; few clay films on ped faces; neutral; abrupt smooth boundary.

R—38 to 40 inches; indurated limestone.

Thickness of the solum and depth to hard limestone ranges from 34 to 39 inches. The A horizon is brown, grayish brown, or dark brown. Reaction is slightly acid or neutral. The Bt horizon is mottled grayish brown, brownish yellow, yellowish red, yellow, and light brownish gray. Reaction in this horizon is slightly acid to mildly alkaline.

Branyon series

The Branyon series consists of very dark gray soils that formed in calcareous, clayey alluvial sediments. The Branyon soils are on broad ancient terraces along major streams. Slopes range from 0 to 3 percent.

Typical pedon of Branyon clay, 0 to 1 percent slopes, from the intersection of Texas Highway 7 and Farm Road 434 near Chilton, 6.0 miles northwest on Farm Road 434, 0.2 mile west on county road, and 75 feet south in cultivated field:

Ap—0 to 5 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate fine granular structure; extremely hard, very firm, sticky and plastic; few fine roots; few very fine pores; calcareous; moderately alkaline; abrupt smooth boundary.

A11—5 to 48 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium angular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots mostly on surfaces of peds; few very fine pores; few fine calcium carbonate concretions; common coarse grooved slickensides form parallelepipeds; few fine waterworn pebbles; calcareous; moderately alkaline; diffuse wavy boundary.

A12—48 to 66 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; few fine roots; few very fine pores; few fine calcium carbonate concretions; many fine slickensides with parallelepipeds; few streaks of very dark gray from above horizon; calcareous; moderately alkaline; diffuse wavy boundary.

AC—66 to 80 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; common fine faint brown mottles; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; few concretions of calcium carbonate; few fine black concretions; few streaks of gray from above horizons; calcareous; moderately alkaline.

The solum ranges from 80 to more than 100 inches in thickness. The Ap and A11 horizons are dark gray or very dark gray. The A12 horizon is dark gray or gray. The AC horizon is gray, grayish brown, light brownish gray, light gray, pale brown, or light yellowish brown, and contains few to common, fine to medium, faint to distinct, brownish, yellowish, or olive mottles. Some pedons have a yellow silty clay IIC horizon below a depth of 80 inches.

Bunyan series

The Bunyan series consists of brown soils that formed in stratified alluvial sediments of mixed origin on the flood plains of small streams. The slopes range from 0 to 1 percent.

Typical pedon of Bunyan fine sandy loam, frequently flooded; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, 7.5 miles northeast on Farm Road 413, 0.75 mile southeast, 0.75 mile northeast, 1.25 miles southeast on county road, and 300 feet west in a creek bottom:

Ap—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; common fine roots; slightly acid; clear smooth boundary.

A1—6 to 24 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; few strata of sandy clay loam; weak medium granular structure; slightly hard, very friable; common fine roots; slightly acid; gradual smooth boundary.

C1—24 to 50 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; common strata of darker sandy clay loam; massive; slightly hard, very friable; few fine roots; slightly acid; gradual smooth boundary.

C2—50 to 80 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; few strata of sandy clay loam; massive; slightly hard, very friable; slightly acid.

The A horizon is brown or pale brown and is slightly acid or neutral. The C horizon is yellowish brown, light yellowish brown, or brown fine sandy loam or loam. Its reaction is medium acid through neutral.

Soils in the Bunyan series have an A horizon that is too thick for the Bunyan series; therefore, they are considered taxadjuncts to the Bunyan series. They are similar in use, management, and behavior to the Bunyan series.

Burleson series

The Burleson series consists of dark gray soils that formed in alkaline clayey sediments. The Burleson soils are on broad ancient stream terraces. Slopes range from 0 to 3 percent.

Typical pedon of Burleson clay, 0 to 1 percent slopes; from the intersection of U.S. Highway 77 and Texas Highway 53 in Rosebud, about 3.0 miles west on Texas Highway 53, 0.7 mile southeast on Farm Road 1963, then 5.5 miles southwest on Farm Road 1671, and 2,000 feet southeast in a cultivated field:

Ap—0 to 5 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; gray (10YR 5/1) hard surface crust about 1/4 inch thick; weak coarse blocky structure; extremely hard, very firm; mildly alkaline; clear abrupt boundary.

A11—5 to 19 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; weak medium angular blocky structure; extremely hard, very firm; shiny pressure faces on peds; mildly alkaline; diffuse wavy boundary.

A12—19 to 37 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium blocky structure; extremely hard, very firm; shiny pressure faces on peds; intersecting slickensides border parallelepipeds that have long axes tilted about 45 degrees from the horizontal; few very fine calcium carbonate concretions; few fine black concretions; mildly alkaline; diffuse wavy boundary.

AC1—37 to 47 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; few fine and medium faint mottles of grayish brown (10YR 5/2); weak coarse blocky structure; extremely hard, very firm; distinct intersecting grooved slickensides border distinct parallelepipeds that are tilted 30 to 60 degrees from horizontal; shiny pressure faces on peds; common black concretions; calcareous; moderately alkaline; diffuse wavy boundary.

AC2—47 to 80 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; few fine faint brownish yellow mottles; extremely hard, very firm; few distinct slickensides and parallelepipeds; few black concretions; few very fine gypsum crystals; few fine cemented calcium carbonate concretions; calcareous in matrix; moderately alkaline.

The combined A and AC horizons range from 50 to 100 inches in thickness. The A horizon is gray, dark gray, or very dark gray. Reaction is neutral to moderately alkaline. The AC horizon is gray, dark gray, grayish brown, light brownish gray, or pale olive and has few to common, brownish, yellowish, or olive mottles. In the upper part mottles are faint to distinct and the soil becomes more distinctly mottled as depth increases. The AC horizon is mildly alkaline or moderately alkaline.

Chazos series

The Chazos series consists of light yellowish brown soils that formed in ancient clayey alluvium on high stream terraces. Slopes range from 1 to 5 percent.

Typical pedon of Chazos loamy fine sand, 1 to 5 percent slopes; 2 miles southwest from the intersection of Texas Highway 6 and Texas Highway 7 in Marlin, 2.0 miles southwest on Texas Highway 6, 0.6 mile northwest on paved county road, then 0.5 mile northeast on private road in pasture:

A1—0 to 6 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak fine granular structure; slightly hard, friable; common fine roots; common fine pores; few fine and medium rounded pebbles of quartz; slightly acid; clear smooth boundary.

A2—6 to 12 inches; very pale brown (10YR 7/4) loamy fine sand, light yellowish brown (10YR 6/4) moist; single grained; slightly hard, very friable; common fine roots; common fine pores; few fine and medium rounded pebbles of quartz; slightly acid; abrupt wavy boundary.

B21t—12 to 22 inches; red (2.5YR 5/8) clay, red (2.5YR 4/8) moist; few fine distinct brownish yellow and light brownish gray mottles; moderate medium angular blocky structure; very hard, very firm; few fine roots; few fine pores; medium acid; diffuse wavy boundary.

B22t—22 to 34 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; many fine prominent yellowish red, common fine faint grayish brown, and common medium prominent red (2.5YR 4/8) mottles; coarse blocky structure; very hard, very firm; few fine roots; few fine pores; medium acid; diffuse wavy boundary.

B23t—34 to 41 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/6) moist; few fine prominent red mottles and common medium distinct light brownish gray (10YR 6/2) and yellowish red (5YR 5/8) mottles; weak coarse blocky structure; very hard, very firm; few fine roots; few fine pores; slightly acid; diffuse smooth boundary.

C1ca—41 to 62 inches; brownish yellow (10YR 6/6) sandy clay, yellowish brown (10YR 5/6) moist; many coarse distinct brown (10YR 3/3), common fine prominent yellowish red, and few fine faint light brownish gray mottles; massive; very hard, firm; few fine concretions of calcium carbonate; many fine brown concretions; calcareous; moderately alkaline; gradual smooth boundary.

C2—62 to 70 inches; pale brown (10YR 6/3) sandy clay, brown (10YR 5/3) moist; many coarse prominent reddish yellow (7.5YR 6/8) mottles; 10 percent bedding planes of shaly clay; massive; very hard, firm; calcareous; moderately alkaline.

The solum ranges from 39 to 50 inches in thickness. The A horizon ranges from 6 to 18 inches in thickness. Reaction is medium acid or slightly acid. The A1 horizon is brown, light yellowish brown, pale brown, or light brownish gray. The A2 horizon is pale brown, very pale brown, light gray, or light brown. The B2t horizon is yellowish red, red, yellowish brown, or brownish yellow clay or sandy clay. It varies in sizes and amounts of reddish, yellowish, grayish, and brownish mottles. Reaction is medium acid or slightly acid. The C horizion is red, light reddish brown, brownish yellow, pale brown, light brownish gray, light gray, or pinkish gray and has varying sizes and amounts of reddish, yellowish, brownish, and grayish mottles. It is sandy clay, sandy clay loam, or clay loam.

Crockett series

The Crockett series consists of brown soils that formed in alkaline marine clays and sandy clays, interbedded with sandier material. Crockett soils are on broad uplands and sloping sides of drainageways. Slopes range from 0 to 8 percent.

Typical pedon of Crockett fine sandy loam, 1 to 3 percent slopes; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, one block northeast on Farm Road 413, 0.5 mile southeast on city street, 0.7 mile northeast on county road, and 150 feet south in pasture:

Ap—0 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; very hard, friable; few fine roots; few fine pores; medium acid; clear wavy boundary.

B21t—9 to 17 inches; mottled brownish yellow (10YR 6/6) and red (2.5YR 5/6) clay; few medium faint grayish brown (10YR 5/2) mottles; weak fine and medium blocky structure; extremely hard, very firm; few fine roots; few fine pores; distinct clay films and dark brown stains on ped faces; few vertical streaks of dark brown soil material that is less clayey; medium acid; diffuse wavy boundary.

B22t—17 to 29 inches; mottled yellow (10YR 7/8) and grayish brown (10YR 5/2) clay; few fine faint reddish yellow mottles; moderate medium blocky structure; extremely hard, very firm; few fine roots; few fine pores; thin clay films on peds; few small pressure faces; vertical streaks of dark brown soil material that is less clayey; medium acid, gradual wavy boundary.

B23t—29 to 42 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; common fine faint brownish yellow mottles; strong medium blocky structure; extremely hard, very firm; few clay films; few small pressure faces; few fine black concretions; slightly acid; gradual wavy boundary.

B3—42 to 53 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/6) moist; common medium faint light brownish gray (10YR 6/2) and few coarse faint reddish yellow (7.5YR 6/8) mottles; weak coarse blocky structure; extremely hard, very firm; few thin clay films; few pressure faces and cleavage planes; few fine black concretions· neutral; abrupt smooth boundary.

C1—53 to 73 inches; yellow (10YR 7/6) sandy clay loam, brownish yellow (10YR 6/6) moist; common coarse prominent light brownish gray (10YR 6/2), white (10YR 8/2), and yellowish brown (10YR 5/8) mottles; massive; hard, firm; calcareous; moderately alkaline; diffuse smooth boundary.

C2—73 to 80 inches; mottled yellow (10YR 7/8), light gray (10YR 7/2), and brownish yellow (10YR 6/8) sandy clay loam; very hard, firm; calcareous; moderately alkaline.

The solum ranges from 40 to 65 inches thick. Soft powdery forms of calcium carbonate begin at a depth of 30 to 60 inches. The A horizon ranges from 4 to 11 inches in thickness. It is light brown, dark grayish brown, brown, light brownish gray, or light yellowish brown. Reaction is medium acid to neutral. The Bt and B3 horizons are mottled in various shades of brown, yellow, red, and olive. The amount of red decreases as depth increases. Texture in these horizons is clay or sandy clay. Reaction is medium acid to mildly alkaline. The C horizon is mottled in various shades of brown, yellow, olive, gray, and white. Texture is loam, sandy clay loam, or clay loam. Reaction is mildly alkaline or moderately alkaline.

Desan series

The Desan series consists of reddish yellow soils that formed in sandy and loamy alluvial sediments on uplands and on ancient stream terraces.

Typical pedon of Desan loamy fine sand, 0 to 5 percent slopes; from the intersection of U. S. Highway 77 and Farm Road 431 in Travis, about 5.5 miles northeast on Farm Road 431, 4.4 miles north on Farm Road 2027, and 160 feet northeast in pasture:

A1—0 to 8 inches; reddish yellow (7.5YR 6/6) loamy fine sand, strong brown (7.5YR 5/6) moist; single grained; loose; few fine roots; neutral; clear smooth boundary.

A2—8 to 54 inches; reddish yellow (7.5YR 7/6) loamy fine sand, reddish yellow (7.5YR 6/6) moist; single grained; loose; few fine roots; neutral; clear smooth boundary.

B21t—54 to 64 inches; red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few fine roots; common fine pores; few clay films on ped faces; medium acid; diffuse smooth boundary.

B22t—64 to 74 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; slightly hard, friable; common fine pores; few pockets of uncoated white sand grains; the reddish yellow sand grains are bridged with clay; slightly acid; clear smooth boundary.

B23t—74 to 80 inches; red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; weak medium subangular blocky structure; hard, friable; common fine pores; few pockets of uncoated white sand grains; red sand grains are bridged with clay; medium acid.

Thickness of the solum ranges from 66 inches to more than 120 inches. The A horizon is 42 to 65 inches thick, and the A1 horizon is 6 to 10 inches thick. The A1 horizon is brown, light yellowish brown, reddish yellow, or dark yellowish brown. The A2 horizon is very pale brown, light brown, or reddish yellow. The B2t horizon is slightly acid or medium acid fine sandy loam or sandy clay loam. The B21t horizon is red or reddish yellow. The B22t horizon is reddish yellow or yellowish red, and the B23t horizon is red or reddish yellow.

Eddy series

The Eddy series consists of brown soils that formed in material weathered from chalky limestone. The Eddy soils are on tops and sides of ridges. Slopes range from 1 to 5 percent.

Typical pedon of Eddy gravelly clay loam, 1 to 5 percent slopes; from the intersection of Farm Road 1239 and Interstate 35 service road in Eddy, about 1.3 miles south on service road, 0.1 mile northwest on county road, and 75 feet northeast in cultivated field:

Ap—0 to 5 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 4/3) moist; moderate very fine and fine granular structure; hard, firm; many fine roots; common fine pores; about 35 percent by volume of platy fragments of chalk, mostly 0.1 to 3 inches across; calcareous; moderately alkaline; abrupt irregular boundary.

A1—5 to 9 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 4/3) moist; strong fine granular structure; 60 percent chalk fragments in the upper part of the horizon, chalk fragments increase with depth; many fine roots in the upper part of the horizon and few fine roots in the lower part; calcareous; moderately alkaline; abrupt irregular boundary.

C—9 to 60 inches; white (10YR 8/2) weakly cemented marine chalk, hardness is about 2 on the Moh's scale in the upper part and grades to 3 or more on the Moh's scale in the lower part.

Thickness of the solum and depth to chalky limestone range from 3 to 12 inches. The soil is 35 to 60 percent, by volume, weakly to strongly cemented chalky limestone fragments. The fragments are mostly 0.1 inch to 3 inches in length, but some are as long as 10 inches. The A horizon is brown or dark brown. The chalky limestone of the C horizon ranges in hardness from about 1 to slightly less than 3 on the Moh's scale. In some pedons it increases in hardness as depth increases and is more than 3 on the Moh's scale.

Ferris series

The Ferris series consists of light yellowish brown soils that formed in weakly consolidated, calcareous marine sediment. Ferris soils are on the contours of slopes adjacent to large drainageways. Slopes range from 5 to 12 percent.

Typical pedon of Ferris clay in an area of Ferris-Heiden complex, 5 to 12 percent slopes, severely eroded; from the intersection of Farm Road 438, Farm Road 935, and a county road in Belfalls on county road (on the county line between Bell and Falls Counties) 1.8 miles northwest on country road; 0.9 mile northeast on second county road; and 100 feet north in a pasture:

Ap—0 to 10 inches; light yellowish brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) moist; weak fine and medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; common fine roots; calcareous; moderately alkaline; gradual smooth boundary.

AC—10 to 38 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; few fine distinct yellow mottles; weak fine angular blocky structure; extremely hard, very firm; very sticky and very plastic; few fine roots; common coarse intersecting slickensides below a depth of 25 inches; parallelepipeds have long axes tilted up to 45 degrees from the horizontal; pressure faces are shiny; calcareous; moderately alkaline; gradual wavy boundary.

C—38 to 60 inches; mottled light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) shaly clay; few fine faint reddish yellow mottles; weak coarse angular blocky structure mixed with coarse blocky rock (shale) structure; extremely hard, very firm; few coarse slickensides; calcareous; moderately alkaline.

The solum ranges from 32 inches to more than 60 inches in thickness. The A horizon is 3 to 12 inches thick. It is dark grayish brown, light olive brown, or light yellowish brown. The AC horizon is light yellowish brown, olive yellow, olive, or light brownish gray and has various sizes and amounts of grayish brown, olive, and yellow mottles. The C horizon is pale brown, yellow, pale yellow, light yellowish brown, light brownish gray, or light gray. It is strongly weathered shaly clay or shale. Calcium carbonate concretions range from 2 to 35 percent in the AC and C horizons.

Gaddy series

The Gaddy series consists of light brown soils that formed in stratified, calcareous, loamy alluvial sediment. Gaddy soils are on low bottom lands that extend to the edge of the river. Slopes range from 0 to 1 percent.

Typical pedon of Gaddy loamy fine sand in an area of Gaddy soils, frequently flooded; from the intersection of U. S. Highway 77 and Farm Road 431 in Travis, about 5.5 miles northeast on Farm Road 431, 0.5 mile north on Farm Road 2027, 2.2 miles northeast on private road, and 25 feet east of road in pasture:

A1—0 to 7 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; common fine roots; calcareous; moderately alkaline; clear smooth boundary.

C—7 to 80 inches; very pale brown (10YR 7/4) fine sand, light yellowish brown (10YR 6/4) moist; very thin strata of darker fine sandy loam that decreases with depth; single grained; loose, very friable; few fine roots; bedding planes are evident; calcareous; moderately alkaline.

The A1 horizon is light yellowish brown, light brown, or reddish yellow loamy fine sand, fine sandy loam, or silt loam 7 to 12 inches thick. The C horizon is very pale brown, pink, light brown, light yellowish brown, or yellow fine sand or loamy fine sand and thin strata of finer material.

Gowen series

The Gowen series consists of very dark grayish brown soils that formed in loamy alluvial sediment derived predominantly from noncalcareous soils. Gowen soils are on flood plains of small streams. The slopes range from 0 to 1 percent.

Typical pedon of Gowen clay loam, frequently flooded; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, about 5.4 miles east on Farm Road 413, 120 feet south in a pasture:

A11—0 to 23 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; hard, firm, sticky; common fine roots; common fine pores; neutral; clear smooth boundary.

A12—23 to 36 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, firm, sticky; common fine roots; common fine pores; few worm casts; neutral; clear smooth boundary.

C—36 to 80 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; few thin strata of grayish brown fine sandy loam, and few thin strata of brownish yellow clay in the lower part; massive; hard, firm; few fine roots; neutral.

The A horizon is very dark grayish brown, dark brown, dark grayish brown, or dark gray. The A12 and C horizons are neutral to moderately alkaline clay loam or loam. The C horizon is brown, dark brown, yellowish brown, grayish brown, or dark grayish brown. In most pedons strata of fine sandy loam to clay are below a depth of about 36 inches.

Heiden series

The Heiden series consists of dark grayish brown soils that formed in alkaline marine clays and material weathered from shales. Heiden soils are on broad ridgetops, side slopes, and foot slopes. Slopes range from 1 to 8 percent.

Typical pedon of Heiden clay, 1 to 3 percent slopes; from the intersection of U. S. Highway 77 and Texas Highway 53 in Rosebud, about 3.0 miles west on Texas Highway 53, 0.7 mile southeast on Farm Road 1963, 1.5 miles west on Farm Road 1671, 1.2 miles south on county road, and 620 feet west in cultivated field:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak angular blocky structure; very hard, very firm, very sticky and very plastic; many fine roots; few snail shell fragments; calcareous; moderately alkaline; clear wavy boundary.

A1—6 to 21 inches; dark grayish brown (2.5Y 4/2) clay; very dark grayish brown (2.5Y 3/2) moist; moderate fine angular blocky structure; very hard, very firm, very sticky and very plastic; few parallelepipeds in the lower part; few fine roots; shiny ped faces; common very fine cemented calcium carbonate concretions in the lower part; calcareous; moderately alkaline; diffuse wavy boundary.

AC—21 to 45 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; many medium faint mottles of light yellowish brown (2.5Y 6/4); moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; parallelepipeds about 1 to 3 inches long that have axes tilted 10 to 60 degrees from the horizontal; intersecting slickensides; few vertical streaks of dark gray; few very fine cemented calcium carbonate concretions in the upper part; few gypsum crystals in the lower part; calcareous; moderately alkaline; diffuse boundary.

C—45 to 80 inches; yellow (2.5Y 7/8) shaly clay, olive yellow (2.5Y 6/8) moist; massive; extremely hard, very firm, very plastic; common very fine gypsum crystals; calcareous; moderately alkaline.

The A and AC horizons range from about 40 to 57 inches in thickness. The A and AC horizons are 40 to 60 percent clay. The A horizons are very dark grayish brown, dark gray, dark grayish brown, grayish brown, or olive gray. The AC horizon is yellowish brown, grayish brown, olive gray, or olive. Some pedons have yellow or olive mottles. The AC horizon is 0 to 2 percent weakly to strongly cemented calcium carbonate concretions. The C horizon is grayish brown, light gray, very pale brown, yellow, light olive brown, light brownish gray, light yellowish brown, olive yellow, olive gray, olive, light olive gray, or pale olive. It is strongly weathered shaly clay, calcareous shales, or clay.

Highbank series

The Highbank series consists of reddish brown soils that formed in loamy and clayey alluvium. Highbank soils are on high bottom lands. Slopes range from 0 to 1 percent.

Typical pedon of Highbank silty clay loam; from the intersection of Texas Highway 6 and Texas Highway 7 in Marlin, 2.4 miles west on Texas Highway 7, 0.2 mile northwest on a county road, and 50 feet north of county road in a cultivated field:

Ap—0 to 6 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; hard, friable; slightly sticky; many fine roots; many fine pores; many worm casts; calcareous; moderately alkaline; abrupt smooth boundary.

A1—6 to 14 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky; many fine roots; many fine pores; few snail shell fragments; calcareous; moderately alkaline; clear smooth boundary.

B2—14 to 24 inches; reddish brown (5YR 5/4) silty clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky; few fine roots; few fine pores; few snail shell fragments; common bedding planes; calcareous; moderately alkaline; abrupt smooth boundary.

Ab—24 to 48 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium blocky structure; very hard, very firm, very sticky and plastic; few fine roots; shiny ped faces; calcareous; moderately alkaline; gradual smooth boundary.

B21b—48 to 56 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; weak medium blocky structure; very hard, very firm, very sticky and plastic; few fine slickensides; shiny ped faces; calcareous; moderately alkaline; gradual smooth boundary.

B22b—56 to 62 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; weak medium blocky structure; very hard, very firm, very sticky and plastic; shiny ped faces; few strongly cemented calcium carbonate concretions; calcareous; moderately alkaline.

The A horizon is yellowish red or reddish brown. The B2 horizon is reddish brown, light reddish brown, or yellowish red silty clay loam or silty clay. Stratification varies from faint to distinct. The Ab and B2b horizons are dark reddish gray, reddish gray, reddish brown, or dark brown clay or silty clay loam.

Houston Black series

The Houston Black series consists of very dark gray soils that formed in alkaline marine clays and material weathered from shales. Houston Black soils are on smooth ridges and foot slopes of uplands. Slopes range from 0 to 3 percent.

Typical pedon of Houston Black clay, 1 to 3 percent slopes, from the intersection of U. S. Highway 77 and Texas Highway 53 in Rosebud, 6.6 miles southwest on Texas Highway 53, 0.7 mile southwest on county road, and 100 feet north in a cultivated field:

A11—0 to 8 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate fine subangular blocky structure and moderate medium granular structure; extremely hard, very firm, very sticky and plastic; many fine roots; shiny ped faces; few fine weakly cemented calcium carbonate concretions; calcareous; moderately alkaline; clear wavy boundary.

A12—8 to 28 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate fine angular blocky structure; extremely hard, very firm, very sticky and plastic; few fine roots; coarse grooved slickensides form parallelepipeds in the lower part; shiny ped faces; few fine weakly cemented calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

A13—28 to 48 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong coarse angular blocky structure; extremely hard, very firm, very sticky and plastic; few fine roots; coarse grooved intersecting slickensides form parallelepipeds; few snail fragments; shiny ped faces; few fine weakly cemented calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

AC1—48 to 67 inches; olive gray (5Y 4/2) clay, dark olive gray (5Y 3/2) moist; common medium faint mottles of pale olive (5Y 6/3); strong coarse angular blocky structure; extremely hard, very firm, very sticky and plastic; few fine roots; coarse grooved intersecting slickensides form parallelepipeds; shiny ped faces; few streaks of dark gray from horizon above; few fine black concretions; few fine strongly and weakly cemented calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

AC2—67 to 80 inches; distinctly and coarsely mottled olive yellow (2.5Y 6/6) and light brownish gray (2.5YR 6/2) clay; common fine brownish yellow mottles; weak medium angular blocky structure; very hard, very firm, very sticky and plastic; few fine roots; few intersecting slickensides form parallelepipeds; few fine black concretions; calcareous; moderately alkaline.

The A horizon ranges from 20 to 52 inches in thickness. It is very dark gray, dark gray, or gray. Intersecting slickensides begin at a depth of 16 to 24 inches. The AC1 horizon is grayish brown, dark grayish brown, light brownish gray, or olive gray. Some pedons have few to common fine mottles of brown, grayish brown, brownish yellow, and yellow. The AC2 horizon is light brownish gray, pale brown, brownish yellow, yellow, light gray, very pale brown, grayish brown, light olive brown, olive yellow, pale olive, olive gray, or olive. Most pedons are mottled with one or more of these colors. Some pedons have a C horizon of marly clay or shaly clay at a depth of 61 to 85 inches.

Lewisville series

The Lewisville series consists of dark grayish brown soils that formed in calcareous clayey alluvium on terraces along major streams. Slopes range from 1 to 5 percent.

Typical pedon of Lewisville silty clay, 1 to 3 percent slopes; from the intersection of U. S. Highway 77 and Farm Road 107, which is 2 miles west of Chilton, about 1.8 miles west on Farm Road 107 and 75 feet south in a cultivated field:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay; very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable, sticky; many fine roots; few strongly cemented calcium carbonate concretions; calcareous; moderately alkaline; clear smooth boundary.

A1—6 to 15 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, firm, sticky; few fine roots; few snail shell fragments; calcareous; moderately alkaline; gradual smooth boundary.

B21ca—15 to 34 inches; brown (7.5YR 5/2) silty clay, dark brown (7.5YR 4/2) moist; moderate fine subangular blocky structure; hard, firm, sticky; common worm casts of lighter color; calcareous; moderately alkaline; gradual smooth boundary.

B22ca—34 to 50 inches; strong brown (7.5YR 5/6) silty clay, dark brown (7.5YR 4/4) moist; weak subangular blocky structure; hard, firm; few strongly cemented calcium carbonate concretions 1 to 3 millimeters in diameter; common threads and bodies of soft calcium carbonate; calcium carbonate equivalent is 33 percent; calcareous; moderately alkaline; gradual smooth boundary.

B23ca—50 to 65 inches; light brown (7.5YR 6/4) silty clay, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; hard, friable; common strongly cemented calcium carbonate concretions 2 millimeters to 5 millimeters in diameter; moderately alkaline.

The solum is 35 to about 70 inches thick. The A horizon is dark grayish brown or brown and ranges from 11 to 18 inches in thickness. The B21ca horizon is dark grayish brown, olive brown, light yellowish brown, brown, or dark yellowish brown. The B22ca horizon is grayish brown, light yellowish brown, yellowish brown, very pale brown, light brown, or strong brown. It is 5 percent to 10 percent visible carbonates. The B23ca horizon, where present, is light yellowish brown, yellowish brown, yellow, very pale brown, or light brown.

Lott series

The Lott series consists of dark grayish brown soils that formed in marly clays, clayey marls, or chalky marls. Lott soils are on broad tops and adjoining sides of ridges. Slopes range from 1 to 5 percent.

Typical pedon of Lott silty clay, 1 to 3 percent slopes; from the intersection of Farm Road 1240 and Texas Highway 6 in Perry, 7.0 miles east on Farm Road 1240, 3.4 miles north on Farm Road 2603, and 192 feet east in a cultivated field:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine

granular structure; slightly hard, friable; common fine roots; few fine pores; few snail shell fragments; few fine rounded siliceous pebbles; calcareous; moderately alkaline; clear smooth boundary.

A1—5 to 15 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure and granular structure; hard, firm; common fine roots; calcium carbonate equivalent is 54 percent; few fine and medium fragments of chalk; few snail shell fragments; few fine siliceous pebbles; calcareous; moderately alkaline; clear smooth boundary.

B21—15 to 30 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, firm; few fine roots; calcium carbonate equivalent is 60 percent; few fine and medium fragments of chalk; few snail shell fragments; few worm casts; calcareous; moderately alkaline; clear smooth boundary.

B22ca—30 to 47 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; few fine faint very pale brown mottles; weak fine subangular blocky structure; hard, firm; common worm casts; calcium carbonate equivalent is 66 percent; common fine and medium fragments of chalk and soft bodies of calcium carbonate; calcareous; moderately alkaline; clear smooth boundary.

C—47 to 80 inches; mottled light gray (10YR 7/2), yellow (10YR 8/6), and white (10YR 8/1) chalky marl; massive to blocky structure and weak conchoidal fractures; very hard and brittle, very firm; many soft calcium carbonate bodies and few fine fragments of chalk in the upper part; calcareous; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness. Beginning at a depth of 10 inches, the calcium carbonate equivalent ranges from 50 to 65 percent. This soil is silty clay, silty clay loam, or clay loam. Clay content ranges from 35 to 50 percent. Of this, 25 to 35 percent is silicate clay. In some areas a few waterworn pebbles are on the surface and within the solum. The A horizon is dark grayish brown or very dark grayish brown. The B21 horizon is pale brown, brown, grayish brown, or pale yellow. The B22ca horizon is brown, pale brown, very pale brown, light yellowish brown, or pale yellow. The C horizon is yellow, light gray, very pale brown, or white marly clay, chalky marl, or clayey marl.

Normangee series

The Normangee series consists of brown soils that formed in alkaline marine sediment, clay, sandy clay, and material weathered from shale. Normangee soils are on broad uplands, narrow ridgetops, and sloping sides of drainageways. Slopes range from 0 to 5 percent.

Typical pedon of Normangee clay loam, 1 to 3 percent slopes; from the intersection of U. S. Highway 77 and Loop 265 in Rosebud, 0.5 mile northeast on Loop 265, then 5.5 miles southeast on Farm Road 413, and 300 feet northwest in pasture:

Ap—0 to 8 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky; very hard, firm; few rounded pebbles of quartz; neutral; clear wavy boundary.

B21t—8 to 17 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; few fine faint dark brown and few medium faint dark grayish brown (10YR 4/2) mottles; moderate medium blocky structure; extremely hard, very firm; few fine black concretions; few fine quartz pebbles; distinct clay films on peds; neutral; gradual smooth boundary.

B22t—17 to 30 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; common medium distinct strong brown (7.5YR 5/6) and few medium faint dark grayish brown (10YR 5/2) mottles; moderate medium blocky structure; extremely hard, very firm; few fine black concretions and pebbles of quartz; distinct clay films on peds; neutral; gradual smooth boundary.

B23t—30 to 42 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; common medium distinct mottles of strong brown (7.5YR 5/6), brownish yellow (10YR 6/8), and pale brown (10YR 6/3); weak fine blocky structure; extremely hard, very firm; few clay films; neutral; gradual smooth boundary.

C—42 to 60 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; common medium faint light yellowish brown (10YR 6/4) and dark yellowish brown (10YR 4/6) mottles and few fine distinct strong brown mottles; massive; extremely hard, very firm; few fine soft bodies of calcium carbonate; mildly alkaline.

The solum ranges from 40 to 46 inches in thickness. The A horizon is dark grayish brown, dark brown, brown, or yellowish brown. Reaction is medium acid to neutral. The B21t horizon is reddish brown, yellowish brown, or brown and has few to common fine or medium mottles of reddish brown, red, yellowish red, dark grayish brown, dark brown, very pale brown, or yellowish brown. Its reaction is slightly acid or neutral. The B22t and B23t horizons are grayish brown, dark brown, brown, pale brown, very pale brown, dark yellowish brown, light yellowish brown, or light brown. They have various amounts and sizes of yellowish, reddish, or brownish mottles. The B22t, B23t, and C horizons are neutral to moderately alkaline. The C horizon is gray, light brownish gray, or yellowish brown weathered shale, clay, or clay loam.

Ovan series

The Ovan series consists of dark grayish brown soils that formed in calcareous clayey alluvium. Ovan soils are on the flood plains of major streams. Slopes range from 0 to 1 percent.

Typical pedon of Ovan silty clay, frequently flooded; from the intersection of U. S. Highway 77 and Texas Highway 7, which is 0.8 mile west of Chilton, about 0.4 mile southeast on U. S. Highway 77, and 210 feet east in pasture:

Ap—0 to 7 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium fine granular structure; very hard, very firm, very sticky and plastic; common fine roots; few snail shell fragments; calcareous; moderately alkaline; abrupt smooth boundary.

A11—7 to 29 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak medium angular blocky structure; very hard, very firm, very sticky and plastic; common fine roots; COLE 0.09; shiny pressure faces on peds; vertical cracks 1/2 inch wide extend through this horizon; calcareous; moderately alkaline; diffuse smooth boundary.

A12—29 to 46 inches; dark grayish brown (2.5Y 4/2) silty clay very dark grayish brown (2.5Y 3/2); moderate medium angular blocky structure; very hard, very firm, very sticky and plastic; few fine roots; COLE 0.09; few calcium carbonate threads and films in lower part; few coarse slickensides that do not intersect; few parallelepipeds; calcareous; moderately alkaline; diffuse boundary.

B2—46 to 80 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium blocky structure; very hard, very firm, very sticky and plastic; common calcium carbonate threads and films; few coarse slickensides and parallelepipeds; calcareous; moderately alkaline.

The solum ranges from 60 inches to more than 90 inches thick. Calcium carbonate films, threads, or soft bodies are at a depth of 30 inches to more than 60 inches. The A horizon is dark grayish brown, grayish brown, dark brown, or brown and ranges from 39 to 48 inches in thickness. The B horizon is dark grayish brown, brown, pale brown, light yellowish brown, or grayish brown. Some pedons have few fine faint yellowish brown mottles. The C horizon, where present, is dark grayish brown or brown.

Padina series

The Padina series consists of pale brown soils that formed in thick sandy beds that appear to have been reworked by wind. Padina soils are on uplands and stream terraces. Slopes range from 0 to 5 percent.

Typical pedon of Padina fine sand, 0 to 5 percent slopes, from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, 8.0 miles southeast on Texas Highway 6 toward Bremond, 4.6 miles north on Texas Highway 14, 0.6 mile southeast on a county road, and 100 feet north of county road in wooded area:

A1—0 to 8 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grained; loose; common fine, medium, and coarse roots; medium acid; clear smooth boundary.

A2—8 to 49 inches; very pale brown (10YR 7/4) fine sand, light yellowish brown (10YR 6/4) moist; single grained; loose; few fine and medium roots; medium acid; clear wavy boundary.

B21t—49 to 65 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; common coarse distinct reddish yellow (5YR 6/6) and few fine distinct strong brown and light gray mottles; weak coarse blocky structure; very hard, very firm; few fine roots; few fine pores; thin patchy clay films; strongly acid; gradual smooth boundary.

B22t—65 to 80 inches; white (10YR 8/2) sandy clay loam, light gray (10YR 7/2) moist; many coarse prominent red (2.5YR 4/6) and common medium prominent reddish yellow (7.5YR 6/6) mottles; weak coarse blocky structure; hard, firm; few fine roots; few fine pores; strongly acid.

The A horizon ranges from 40 to 80 inches in thickness. Reaction is neutral to medium acid. The A1 horizon is brown, pale brown, or yellowish brown. The A2 horizon is light gray, light yellowish brown, or very pale brown. The Bt horizon is pale brown, white, brownish yellow, very pale brown, or yellow and has various sizes and amounts of red, yellow, and gray mottles. Reaction is slightly acid to strongly acid.

Roetex series

The Roetex series consists of reddish brown soils that formed in clayey alluvial sediments. Roetex soils are on flood plains, in slackwater areas, swales, or old channels. Slopes are 0 to 1 percent.

Typical pedon of Roetex clay, frequently flooded; from the intersection of Texas Highway 6 and Texas Highway 7 in Marlin, 7.4 miles southeast on Texas Highway 6, southwest 4.0 miles, 0.8 mile north on county road, and 900 feet east in a field:

Ap—0 to 5 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; weak fine blocky structure; very hard, firm; few fine roots; few snail fragments; calcareous; moderately alkaline; clear smooth boundary.

A1—5 to 12 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate very fine and fine blocky structure; very hard, firm; few shiny pressure faces on some peds; few snail shell fragments; calcareous; moderately alkaline; gradual smooth boundary.

B21—12 to 20 inches; reddish brown (2.5YR 4/4) silty clay, dark reddish brown (2.5YR 3/4) moist; few medium distinct grayish brown (10YR 5/2) and few medium prominent greenish gray (5GY 5/1) mottles; moderate fine and medium blocky structure; very hard, very firm, very sticky and plastic; few very fine pores; few shiny pressure faces on some peds; streaks of darker material from horizon above; calcareous; moderately alkaline; gradual wavy boundary.

B22—20 to 54 inches; red (2.5YR 4/6) silty clay, dark red (2.5YR 3/6) moist; common medium and coarse distinct grayish brown (10YR 5/2), few medium distinct dark gray (10YR 4/1), and medium prominent greenish gray (5GY 5/1) mottles; moderate medium blocky structure; very hard, very firm, very sticky and plastic; few very fine pores; common fine slickensides; few fine black concretions; calcareous; moderately alkaline; gradual wavy boundary.

C—54 to 62 inches; reddish brown (2.5YR 4/4) silty clay, dark reddish brown (2.5YR 3/4) moist; common medium prominent grayish brown (10YR 5/2) mottles; massive; very hard, very firm, very sticky and plastic; common fine slickensides; few fine strongly cemented calcium carbonate concretions; calcareous; moderately alkaline.

The solum ranges from 50 to 56 inches in thickness. The A horizon is dark reddish brown, reddish brown, or dark brown. The B2 horizon is reddish brown or red. The C horizon is reddish brown, reddish gray, or dark brown. The B2 and C horizons are clay and silty clay that have few to common, fine to coarse, and distinct to prominent grayish and brownish mottles.

Satin series

The Satin series consists of black soils that formed in ancient gravelly clay sediment on broad uplands. Slopes range from 1 to 5 percent.

Typical pedon of Satin clay loam, 1 to 5 percent slopes; from the intersection of Texas Highway 6 and Texas Highway 7 in Marlin, 4.0 miles north on Texas Highway 6, 0.2 mile west on a county road, and 230 feet south in a pasture:

A1—0 to 5 inches; black (N 2/0) clay loam, black (N 2/0) moist; moderate very fine and fine subangular blocky structure; very hard, firm; many fine roots; about 10 percent by volume of siliceous pebbles from 2 millimeters to 10 millimeters in diameter; mildly alkaline; clear wavy boundary.

B21t—5 to 11 inches; black (N 2/0) very gravelly clay, black (N 2/0) moist; moderate very fine subangular blocky structure; extremely hard, firm; many fine roots; about 55 percent by volume of siliceous pebbles from 2 millimeters to 10 millimeters across; moderately alkaline; clear wavy boundary.

B22t—11 to 18 inches; brown (7.5YR 4/2) very gravelly clay, dark brown (7.5YR 3/2) moist; moderate very fine subangular blocky structure; extremely hard, firm; common fine roots; about 55 percent by volume of siliceous pebbles from 2 millimeters to 10 millimeters in diameter; moderately alkaline; clear wavy boundary.

B23t—18 to 34 inches; brown (7.5YR 5/2) very gravelly clay, dark brown (7.5YR 4/2) moist; few fine faint brown mottles; weak fine blocky structure; very hard, firm; few fine roots; about 50 percent by volume of siliceous pebbles 2 millimeters to 10 millimeters in diameter; moderately alkaline; abrupt wavy boundary.

C—34 to 80 inches; mottled light gray (10YR 7/2) and light yellowish brown (10YR 6/4) clayey marl; massive; hard, firm; common masses of calcium carbonate; calcareous; moderately alkaline.

The solum ranges from 24 to 40 inches in thickness. The A horizon is black, dark gray, or very dark grayish brown and is neutral or mildly alkaline. Siliceous pebble content ranges from 2 to 25 percent, by volume. The B21t horizon is black, very dark grayish brown, dark gray, or dark grayish brown. The B22t horizon is dark brown, dark grayish brown, yellowish brown, brown, grayish brown, very dark grayish brown, or dark yellowish brown. The B23t horizon is brown, yellowish brown, or pale brown. Some pedons have few yellowish brown, brownish yellow, or light yellowish brown mottles. The B2t horizon is neutral through moderately alkaline very gravelly clay or gravelly clay. Siliceous pebbles range from 35 to 75 percent, by volume, in the B2t horizon. The C horizon is light gray, light yellowish brown, pale brown, brownish yellow, very pale brown, or yellow. It is clayey marl or chalky marl that is 0 to 10 percent, by volume, siliceous pebbles.

Ships series

The Ships series consists of reddish brown soils that formed in stratified clayey alluvial sediment. The Ships soils are on broad, high flood plains. Slopes range from 0 to 1 percent.

Typical pedon of Ships clay; from the intersection of Texas Highway 7 and Texas Highway 6 in Marlin, 0.8 mile west on Texas Highway 7, and 315 feet north in a cultivated field:

Ap—0 to 6 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; weak fine blocky structure; very hard, firm; common fine roots; calcareous; moderately alkaline; clear smooth boundary.

A1—6 to 34 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate fine blocky structure; very hard, very firm; common fine roots; shiny pressure faces on some peds; calcareous; moderately alkaline; gradual wavy boundary.

B2—34 to 54 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; moderate fine blocky structure; very hard, very firm; few fine roots; few short slickensides; vertical streaks of darker soil from horizon above; few small calcium carbonate concretions; calcareous; moderately alkaline; diffuse wavy boundary.

C—54 to 80 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; massive; very hard, very firm; few short slickensides; few threads and soft bodies of calcium carbonate; few calcium carbonate concretions; calcareous; moderately alkaline.

The solum ranges from 30 to 60 inches in thickness. Soft powdery forms of calcium carbonate begin at a depth of 29 to 34 inches. Coefficient of Linear Extensibility (COLE) in the upper 40 inches is 0.13 to 0.15. The A horizon is dark brown, reddish brown, or dark reddish brown and is 20 to 39 inches thick. The B2 horizon is reddish brown, dark reddish brown, or red clay or silty clay. The C horizon is reddish brown or dark reddish brown clay or silty clay loam. In some pedons a IIAb horizon of clay or silty clay underlies the B2 horizon.

Silawa series

The Silawa series consists of pale brown soils that formed in sandy and loamy sediment on high stream terraces. Slopes range from 0 to 8 percent.

Typical pedon of Silawa fine sandy loam, 1 to 3 percent slopes; from the intersection of Farm Road 2027 and Farm Road 1048 in the Pleasant Grove Community, 2.5 miles north on Farm Road 2027, 1.9 miles east on a county road, and 225 feet south in a pasture:

Ap—0 to 6 inches; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; slightly acid; clear smooth boundary.

A2—6 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

B2t—13 to 38 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; very hard, firm; common very fine roots and pores; clay films on faces of peds; sand grains bridged and coated; few fine siliceous pebbles; medium acid; diffuse smooth boundary.

B3—38 to 59 inches; red (2.5YR 5/8) fine sandy loam, red (2.5YR 4/8) moist; weak coarse prismatic structure parting to weak fine subangular blocky; hard, firm; few very fine roots and pores; few fine siliceous pebbles; medium acid; diffuse smooth boundary.

C—59 to 70 inches; red (2.5YR 5/8) loamy fine sand, red (2.5YR 4/8) moist; massive; slightly hard, friable; medium acid.

The Ap or A1 horizon is pale brown, brown, dark brown, dark grayish brown, dark yellowish brown, light yellowish brown, or light brown. The A2 horizon is brown, light brown, light yellowish brown, or very pale brown. The A horizon is medium acid or slightly acid fine sandy loam or loamy fine sand. The B2t horizon is red, yellowish red, or reddish brown. Reaction in this horizon is medium acid or strongly acid. The B3 and C horizons are red, light red, yellowish red, or reddish yellow. Reaction in these horizons is medium acid or strongly acid. The B3 horizon is fine sandy loam or sandy clay loam. The C horizon is loamy fine sand or fine sandy loam.

Silstid series

The Silstid series consists of brown soils that formed in residue weathered from beds of sandy and loamy material on uplands and stream terraces. Slopes range from 0 to 3 percent.

Typical pedon of Silstid loamy fine sand, 0 to 3 percent slopes; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, about 6.5 miles northeast on Farm Road 413, 4.0 miles south on Farm Road 2413, 2.1 miles northeast and 1.0 mile southeast on county road, 0.2 mile south on Texas Highway 14, 0.8 mile southeast on county road, 400 feet south on private road, and 600 feet northwest in wooded pasture:

A1—0 to 10 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; single grained; loose, friable; common fine and medium roots; slightly acid; clear smooth boundary.

A2—10 to 26 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose, friable; common fine roots; slightly acid; clear smooth boundary.

B21t—26 to 43 inches; brownish yellow (10YR 6/6) sandy clay loam; yellowish brown (10YR 5/6) moist; common fine faint pale brown and few medium distinct reddish yellow (5YR 6/8) mottles; weak coarse prismatic structure parting to weak fine medium subangular blocky; hard, friable; few fine roots; patchy clay films; medium acid; gradual smooth boundary.

B22t—43 to 56 inches; yellow (10YR 7/6) sandy clay loam, brownish yellow (10YR 6/6) moist; few medium faint light gray (10YR 7/2) and common medium distinct reddish yellow (7.5YR 7/8) mottles; weak medium subangular blocky structure; hard, friable; few fine roots; clay films on ped faces; medium acid; gradual smooth boundary.

B23t—56 to 80 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; common medium and coarse distinct reddish yellow (7.5YR 7/8; 5YR 6/8) mottles; weak medium subangular blocky structure; hard, friable; few fine roots; few clay films; medium acid.

This soil is slightly acid or medium acid. The A horizon ranges from 21 to 34 inches in thickness. The A1 horizon is brown or pale brown. The A2 horizon is pale brown, light yellowish brown, or very pale brown. The Bt horizon is yellowish brown, brownish yellow, or yellow sandy clay loam or fine sandy loam. Throughout the Bt horizon are various amounts and sizes of red and yellow mottles.

Stephen series

The Stephen series consists of dark grayish brown soils that formed in material weathered from interbedded chalk, marl, or soft limestone rubble. Stephen soils are on ridges and side slopes. Slopes range from 1 to 4 percent.

Typical pedon of Stephen silty clay, 1 to 4 percent slopes, from the intersection of Farm Road 1238 and Interstate Highway 35 service road in Eddy, 1.3 miles south on Interstate Highway 35 service road, 0.9 mile southwest on county road, 0.5 mile northwest on second county road, and 1,180 feet northeast in a cultivated field:

A1—0 to 15 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure and granular structure; hard, firm, sticky and plastic; few fine roots; few fine fragments of chalk; calcareous; moderately alkaline; abrupt wavy boundary.

C1&A—15 to 19 inches; about 70 percent white (10YR 8/2) platy chalk fragments and platy chalk in place, about 30 percent dark brown (10YR 4/3) silty clay in the horizontal and vertical crevices and between the loose chalk fragments; few fine roots; calcareous; moderately alkaline; abrupt irregular boundary.

C2—19 to 28 inches; white (10YR 8/2) and very pale brown (10YR 8/3) platy chalk that is less than 3 on Moh's scale; few tongues of dark brown silty clay in crevices between some chalk plates.

Thickness of the solum, and depth to chalky limestone ranges from 11 to 19 inches. The A horizon is 2 to 10 percent, by volume chalk fragments. It is dark brown, dark grayish brown, or brown. The C1&A horizon is 50 to 70 percent platy chalk fragments. The C2 horizon is white or very pale brown.

Tabor series

The Tabor series consists of brown soils that formed in acid to alkaline clay and sandy clay interbedded with sandier material. Tabor soils are on broad uplands and stream terraces. Slopes range from 0 to 3 percent.

Typical pedon of Tabor fine sandy loam, 1 to 3 percent slopes; from the intersection of Texas Highway 6 and Farm Road 413 in Reagan, about 6.5 miles northeast on Farm Road 413, 4.0 miles south on Farm Road 2413, 1.0 mile northeast on county road to intersection, then 400 feet northwest of county road in a wooded pasture:

A1—0 to 7 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; hard, very friable; slightly acid; clear smooth boundary.

A2—7 to 12 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; hard, very friable; many fine roots; many fine pores; strongly acid; abrupt wavy boundary.

B21t—12 to 28 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; few fine faint mottles of reddish yellow, common fine and medium faint grayish brown (10YR 5/2) mottles on faces of peds, and common medium faint brownish yellow (10YR 6/6) mottles; moderate medium blocky structure; extremely hard, very firm; common fine roots between peds; common fine pores; continuous clay films; COLE 0.08; few black concretions; strongly acid; gradual wavy boundary.

B22t—28 to 44 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; common fine and medium distinct light brownish gray (10YR 6/2) and few fine distinct brownish yellow, brown, and yellowish red mottles; moderate medium and coarse blocky structure; extremely hard, very firm; common fine roots; few fine pores; thin clay films on peds; COLE 0.09; shiny pressure faces; few fine black concretions; strongly acid; gradual wavy boundary.

B3—44 to 54 inches; light gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; few fine reddish yellow and brown, common medium distinct yellowish red (5YR 5/8) and few medium distinct red (2.5YR 5/8) mottles; moderate coarse blocky structure; extremely hard, very firm; thin clay films; few fine black concretions; mildly alkaline; gradual wavy boundary.

C—54 to 70 inches; mottled brownish yellow (10YR 6/8), light brownish gray (10YR 6/2), and yellowish red (5YR 5/6) clay; massive; hard, very firm; mildly alkaline.

The solum ranges from 50 to 59 inches in thickness. The A horizon is 8 to 18 inches thick and is slightly acid to strongly acid. The A1 horizon is brown, light brownish gray, or grayish brown. The A2 horizon is light gray, light brownish gray, brown, or pale brown. The B2t horizon is brown, yellowish brown, pale brown, light yellowish brown, or brownish yellow. The B21t has few to many red, yellowish red, yellow, brown, gray, brownish yellow, and light gray mottles. The B22t has few to many brownish yellow and light gray mottles. Reaction in this horizon is strongly acid or very strongly acid. The B2t horizon is clay or clay loam, and Coefficient of Linear Extensibility (COLE) ranges from 0.08 to 0.10. The C horizon is yellowish brown, light brownish gray, pale brown, brownish yellow, light gray, or white and has various amounts and sizes of reddish yellow, yellowish red, yellowish brown, pale brown, or brownish yellow mottles. It is clay, sandy clay loam, or clay loam.

Trinity series

The Trinity series consists of dark gray soils that formed in calcareous clayey alluvium. Trinity soils are on bottom lands and on flood plains along major streams. Slopes range from 0 to 1 percent.

Typical pedon of Trinity clay, frequently flooded; from the intersection of U. S. Highway 77 and Texas Highway 53 in Rosebud, 1.3 miles southwest on Texas Highway 53 and 520 feet south in pasture:

Ap—0 to 6 inches; dark gray (5Y 4/1) clay; very dark gray (5Y 3/1) moist; fine and medium granular structure and fine subangular blocky structure; very hard, firm, very sticky and very plastic; many fine roots; many fine pores; COLE 0.09; calcareous; moderately alkaline; clear smooth boundary.

A11—6 to 17 inches; dark gray (5Y 4/1) clay; very dark gray (5Y 3/1) moist; moderate fine blocky structure; very hard, firm, very sticky and very plastic; common fine roots; common fine pores; shiny pressure faces on peds; COLE 0.09; calcareous; moderately alkaline; diffuse smooth boundary.

A12—17 to 47 inches; dark gray (10YR 4/1) clay; very dark gray (10YR 3/1) moist; weak coarse blocky structure; very firm, very sticky and plastic; common fine roots; common fine pores; shiny pressure faces on peds; few fine calcium carbonate concretions; COLE 0.09; calcareous; moderately alkaline; diffuse smooth boundary.

AC—47 to 67 inches; gray (5Y 5/1) dark gray (5Y 4/1) moist; weak fine blocky structure; very hard, very firm; few slickensides and parallelepipeds; few fine roots; few bodies of calcium carbonate; calcareous; moderately alkaline; diffuse smooth boundary.

C—67 to 80 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; massive; very hard, very firm; common fine calcium carbonate concretions; calcareous; moderately alkaline.

The A horizon is dark gray or very dark gray. Some pedons have various amounts and sizes of brown and olive mottles. The AC horizon, when present, is gray, grayish brown, or light brownish gray. The C horizon is in shades of gray or brown. Some pedons have yellowish brown mottles in this horizon.

Weswood series

The Weswood series consists of reddish brown soils that formed in stratified, calcareous, loamy alluvial sediment. Weswood soils are on high bottom land and on the leveled edges and in bottoms of natural, secondary drainageways in bottom land. Slopes range from 0 to 8 percent.

Typical pedon of Weswood silty clay loam, 0 to 1 percent slopes; from the intersection of Texas Highway 7 and Texas Highway 6 in Marlin, 1.6 miles west on Texas Highway 7, 1.1 miles south on county road, and 100 feet east in a cultivated field:

Ap—0 to 6 inches; reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; weak fine granular structure; hard, friable, slightly sticky; many fine roots; many fine pores; common worm casts; calcareous; moderately alkaline; abrupt smooth boundary.

B2—6 to 18 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak fine and medium granular structure and subangular blocky structure; hard, firm, slightly sticky; many fine roots; many fine and medium pores; common worm casts; few

snail shell fragments; calcareous; moderately alkaline; clear smooth boundary.

C1—18 to 38 inches; stratified reddish brown (5YR 5/4) silty clay loam and yellowish red (5YR 5/6) clay loam; thin strata (1/8 to 1/4 inch thick) of very fine sandy loam and clay; massive, but parts to platy fragments along bedding planes; hard, firm, slightly sticky; many evident bedding planes; common worm casts; calcareous; moderately alkaline; clear smooth boundary.

C2—38 to 60 inches; reddish brown (5YR 5/4) silty clay loam and thin layers of yellowish brown and reddish brown very fine sandy loam and silt loam; massive; hard, firm; common fine pores; many evident bedding planes; few worm casts; calcareous; moderately alkaline.

The A horizon is reddish brown or light reddish brown silty clay loam or silt loam. The B2 horizon is reddish brown, light reddish brown, yellowish red, or reddish yellow silty clay loam or silt loam. The C horizon is reddish brown, yellowish red, light reddish brown, reddish yellow, or pink. Thin strata of fine sandy loam, clay loam, silty clay loam, fine sand, or silty clay are common below a depth of 20 inches.

Wilson series

The Wilson series consists of dark gray soils that formed in alkaline clayey old alluvium or marine clay. Wilson soils are on the tops and sides of ridges and in areas along drainageways. Slopes are 0 to 5 percent.

Typical pedon of Wilson silty clay loam, 0 to 1 percent slopes; from the intersection of U. S. Highway 77 and Loop 265 in Rosebud, 1.8 miles northeast on Loop 265, 0.3 mile southwest on county road, and 60 feet south in a cultivated field:

Ap—0 to 6 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak fine granular structure when moist, massive when dry; very hard, firm, sticky and plastic; mildly alkaline; abrupt wavy boundary.

B21tg—6 to 25 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium blocky structure; extremely hard, very firm, very sticky and very plastic; few fine pores; thin clay films on ped faces; few vertical streaks of dark gray material; mildly alkaline; gradual wavy boundary.

B22tg—25 to 39 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate medium blocky structure; extremely hard, very firm; few fine pores; thin clay films on peds; few pressure faces; few vertical streaks of dark gray material; few fine strongly cemented calcium carbonate concretions; mildly alkaline; gradual wavy boundary.

B3g—39 to 58 inches; light gray (10YR 6/1) clay, gray (10YR 5/1) moist; many fine faint light yellowish brown mottles; weak coarse blocky structure; extremely hard, very firm; patchy clay films on peds; common fine soft bodies and common medium concretions of calcium carbonate; moderately alkaline; gradual smooth boundary.

C—58 to 80 inches; olive gray (5Y 6/2) clay, olive gray (5Y 5/2) moist; few medium distinct yellowish brown (10YR 5/4) mottles; massive; extremely hard, very firm; few soft bodies of calcium carbonate; calcareous; moderately alkaline.

The solum ranges from 44 to 69 inches in thickness. The A horizon is very dark gray, gray, very dark grayish brown, dark gray, dark grayish brown, or grayish brown. It is medium acid to mildly alkaline silty clay loam or loam. The B21tg horizon is very dark gray, black, or dark gray. It is medium acid to mildly alkaline clay, silty clay loam, or clay loam. The B22tg and B3g horizons are dark gray, gray, grayish brown, or light brownish gray. In some pedons the B3g horizon has varying amounts and sizes of strong brown, brown, dark brown, yellowish brown, or olive mottles. The C horizon is light olive gray, light brownish gray, light yellowish brown, or very pale brown. In some pedons it has varying amounts and sizes of yellow, brownish yellow, light yellowish brown, yellowish brown, very pale brown, light gray, or strong brown mottles. The B22tg, B3g, and C horizons are mildly alkaline or moderately alkaline clay, silty clay, or clay loam.

Yahola series

The Yahola series consists of reddish brown soils that formed in slightly altered, loamy, calcareous alluvium. Yahola soils are on long narrow flood plains paralleling the river. Slopes range from 0 to 1 percent.

Typical pedon of Yahola fine sandy loam, occasionally flooded; from the intersection of U. S. Highway 77 and Farm Road 431 in Travis, 5.5 miles northeast on Farm Road 413, 4.3 miles north on Farm Road 2027, 2.7 miles northeast on county road, and 75 feet west in pasture.

A1—0 to 10 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; calcareous; moderately alkaline; gradual smooth boundary.

C1—10 to 37 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; thin strata of loamy fine sand and silt loam in the lower part; massive; slightly hard, very friable; calcareous; moderately alkaline; gradual smooth boundary.

C2—37 to 58 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable; calcareous; moderately alkaline; gradual smooth boundary.

C3—58 to 80 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; thin strata of loamy fine sand and clay loam; massive; slightly hard, very friable; calcareous; moderately alkaline.

The A horizon is reddish brown or yellowish red. The C horizon is reddish brown, yellowish red, light reddish brown, reddish yellow, brown, or pink fine sandy loam, loamy fine sand, or loam that is stratified with coarser and finer soil material.

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*8*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 18, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the

order. An example is Ustoll (*Ust*, meaning burnt, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Calciustolls (*Calci*, meaning limy horizons, plus *ustoll*, the suborder of Mollisols that have an ustic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Calciustolls.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-silty, mixed, thermic, Typic Calciustolls.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition. The Lewisville series is an example of a fine-silty, mixed, thermic, Typic Calciustolls.

Formation of the soils

Soil is a natural, three-dimensional body on the earth's surface. It supports plants and has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned in time by relief.

The interaction of five main factors results in differences among the soils (*7*). These factors are the physical and chemical composition of the parent material, the effect of the climate during and after the accumulation of the parent material, the kind of plants and organisms living in the soil, the relief of the land and its effect on runoff, and the length of time it took the soil to form.

The effect of a factor on a soil can differ from place to place, but the interaction of all the factors determines the kind of soil that forms. In the following paragraphs the factors of soil formation are discussed as they relate to the soils in the survey area.

Climate

Falls County has subhumid, warm temperate climate. Winters are usually short and mild; summers are long and have hot days and warm nights.

This climate contributes to the formation of soils in several ways. In winter, precipitation is mostly in the form of persisting fogs, drizzles, and light showers. These contribute to low soil temperature, poor aeration of soils, and reduction of animal activity and plant growth. In spring, rains of short duration and high intensity retard soil development because of erosion. During hot, dry summers the clay soils, such as Houston Black and Burleson, dry and then develop deep cracks. The cracks fill with water when it rains. After these soils become wet, the soils swell enough to close the cracks. This alternate shrinking and swelling cause the soil to churn and prevent the formation of a B horizon.

The amount of rainfall is enough to leach the calcium carbonate from the upper horizons of some soils, but not enough to leach it out entirely. Most of the soils in the county have specks, threads, or nodules of calcium carbonate throughout the profile. Some soils, such as Axtell and Crockett, have a clayey lower layer. Water moving through the soil carries clay particles downward from the surface layer and deposits them as the water movement slows. As clay accumulates, the water moves even slower and deposition of clay accelerates. Thus, the process tends to speed up and eventually the lower layers become clayey.

Living organisms

Plants, man, animals, insects, bacteria, worms, and fungi are important in the formation of soils. Gains in organic matter and nitrogen in the soil, gains or losses in plant nutrients, and changes in structure and porosity are caused by living organisms. In the western part of the county, tall grasses had more influence on soil development than other plants. These grasses provided litter that protected the surface and added organic matter to dark soils, such as those of the Houston Black, Heiden, and Burleson series. The grass roots reached deep into the soil and fed on minerals at lower depths. Lime, minerals, and organic matter were distributed throughout the soil profile as these plants died and decomposed. The decomposed plant roots left channels that increased intake of water and the aeration of the soil. Earthworms and other soil organisms fed on the decomposed roots. The borings of earthworms also helped channel water and air through the soil.

The vegetation, predominantly oak-savannah, has affected the formation of soils in the eastern part of the county. The soils that formed under hardwood vegetation are medium to low in content of organic matter and have light-colored surface layers. Some of these soils are Padina, Silstid, and Axtell soils.

Man has also influenced soil formation. He permitted cattle to graze the vegetation on the land. He plowed the land and planted crops.

Parent material

Parent material is the unconsolidated mass from which soil is formed. It determines the limits of the chemical and mineral composition of the soil. The soils of Falls County have developed from several kinds of parent materials which range from Upper Cretaceous to Recent in age (4).

In the extreme western corner of the county, the soils formed in place over Austin chalk of the Upper Cretaceous Age. These beds of chalky limestone are generally about 350 feet thick. They are soft in the upper few feet and become increasingly harder as depth increases. They are extremely wavy and in places extend nearly to the surface. Austin and Stephen soils formed on side slopes, and Eddy soils formed on ridges.

In the western part of the county, soils formed in geologic material in the Taylor Group of the Upper Cretaceous Age. The Taylor Group is made up of the Ozan Formation, the Wolf City Formation, and Pecan Gap Chalk. The material is about 700 feet thick and consists of black to very dark gray clay over blue or gray clayey shale. Houston Black, Heiden, and Wilson soils formed in Taylor Group material. A high shrink-swell potential is characteristic of these soils and of the Taylor Group material below them.

Throughout the center of the county is a narrow band of soils that formed in geologic material in the Navarro Group of the Upper Cretaceous Age. The Navarro Group is made up of the Neylandville Formation, Marlbrook Marl, and Kemp Clay. The material is about 500 feet thick and consists of gray to olive clayey shale and marl or sand. Wilson, Burleson, and Crockett soils formed in Navarro Group material.

In the eastern part of the county, soils formed in geologic material in the Midway Group of the Eocene Age. The Midway Group is made up of the Kincaid Formation and the Wills Point Formation. The material is about 600 feet thick and consists of glauconitic clay, other clays, and minor amounts of sandy clay and sand. Axtell, Crockett, and Wilson soils formed in Navarro Group material.

In the extreme southeastern corner of the county, soils formed in geologic material in the Wilcox Group of the Eocene Age. The Wilcox Group is made up of the Hooper Formation and the Simsboro Formation. The material is about 500 feet thick and consists mostly of sand and some mudstone, clay, and mudstone conglomerate. Padina and Silstid soils formed in Wilcox Group materials.

Throughout the county, soils formed along major streams on fluviatile terrace deposits. These deposits range from sandy clay to clay and are as much as 60 feet deep. The finer-textured old alluvium was deposited by slow-moving water and has smooth relief. The Branyon, Burleson, and Wilson soils formed in this material. The sandier material was deposited by faster moving water. Soils that formed in the sandier material are the Axtell, Tabor, Silawa, and Desan soils.

Along the Brazos River and other major streams, soils formed in sandy to clayey Recent alluvium. The texture of this alluvium depends on the rate of water movement and the texture of the soils in the watershed. A characteristic of most Recent alluvial soils is stratified layers of different-textured material throughout the profile. Alluvial soils on some of the lower flood plains are subject to overflow and deposition of fresh alluvial sediment. Soils that formed in clayey material are the Trinity, Ovan, and Ships. Soils that formed from a mixture of sandy and clayey sediment are the Gowen, Weswood, and Yahola.

Relief

Gradient and shape of slopes are characteristics that affect soil development because they control drainage and runoff. If the other factors of soil development are equal, profile development depends on the amount of water that enters the soil. Steep soils absorb less moisture and usually have more poorly developed profiles than those of the gently sloping soils. Soils that formed in depressions, such as Roetex soils, receive runoff water from adjoining slopes and remain wet for long periods.

The Heiden and Ferris soils formed in similar parent materials. Generally, the Ferris soils are steeper and more eroded than the Heiden soils. Erosion has kept the surface layer of Ferris soils thin and light colored. Heiden soils, in contrast, have dark surface layers.

Nearly level or slightly concave soils are likely to have a darker color than sloping soils. The more nearly level and depressional soils receive more moisture, produce more vegetation, and consequently contain more organic matter, which imparts the darker color. The Houston Black and Altoga soils are examples of this contrast. The Houston Black soils are nearly level to gently sloping and very dark gray in color. The Altoga soils are gently sloping to strongly sloping and pale brown in color.

Time

Generally a long time is required for the formation of soils that have distinct horizons. The length of time that parent material has been in place, therefore, commonly is reflected in the development of the soil profile.

Young soils in Falls County formed in recent alluvium. Young soils such as Yahola have very little profile development. Except for a slight accumulation of organic matter and darkening of the surface layer, Yahola soils

retain evidence of stratification and other characteristics of their recent alluvial sediment.

Old soils have well-expressed soil horizons. In places they formed on uplands. Axtell soils are examples of old soils. This parent material has been in place for a long time. Clay particles have moved downward and have accumulated in the subsoil. A thin, darkened upper part of the surface layer and a thin, leached lower part of this layer have formed. Axtell soils bear little resemblance to the original parent material. The clay soils, such as Houston Black, Heiden, and Burleson, are young in terms of horizon development, even though they are old chronologically. Thus, horizon development is not related to passage of time alone.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coefficient of Linear Extensibility (COLE). A quantitative method of determining shrink-swell behavior of soil. It is an estimate of the vertical component of swelling of a natural soil clod. COLE is expressed as: low (00.03); moderate (0.03-0.06); and, high (00.06).

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Parallelepiped. A six-sided prism whose faces are parallelograms; wedge-shaped structural aggregate.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characterisitc that affects management. These differencees are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are—*excellent*, *good*, *fair*, and *poor*. The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in

diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Illustrations

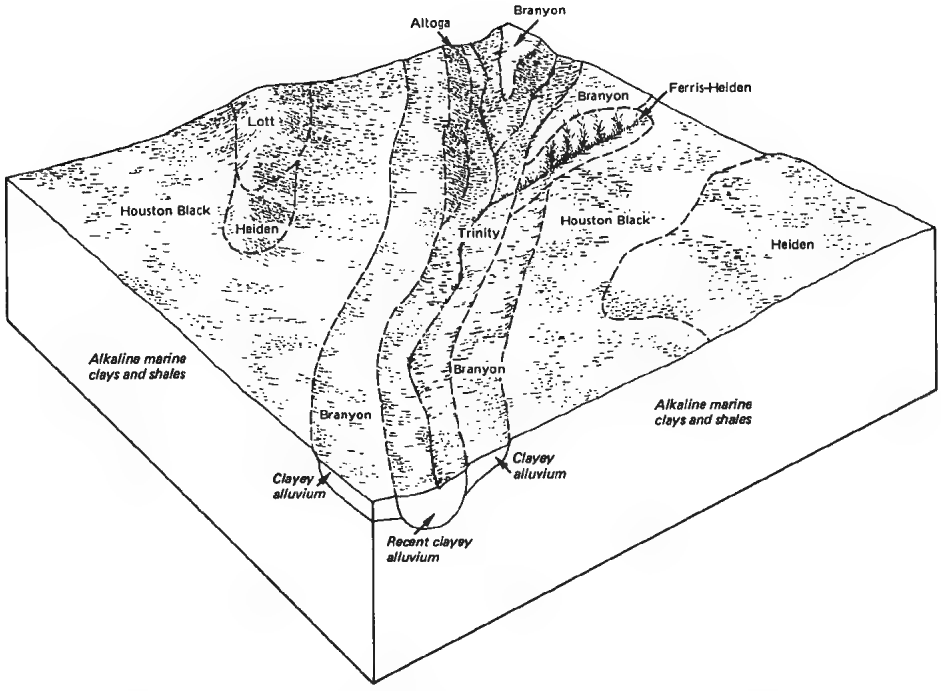

Figure 1.—Typical pattern of soils in the Houston Black-Heiden map unit.

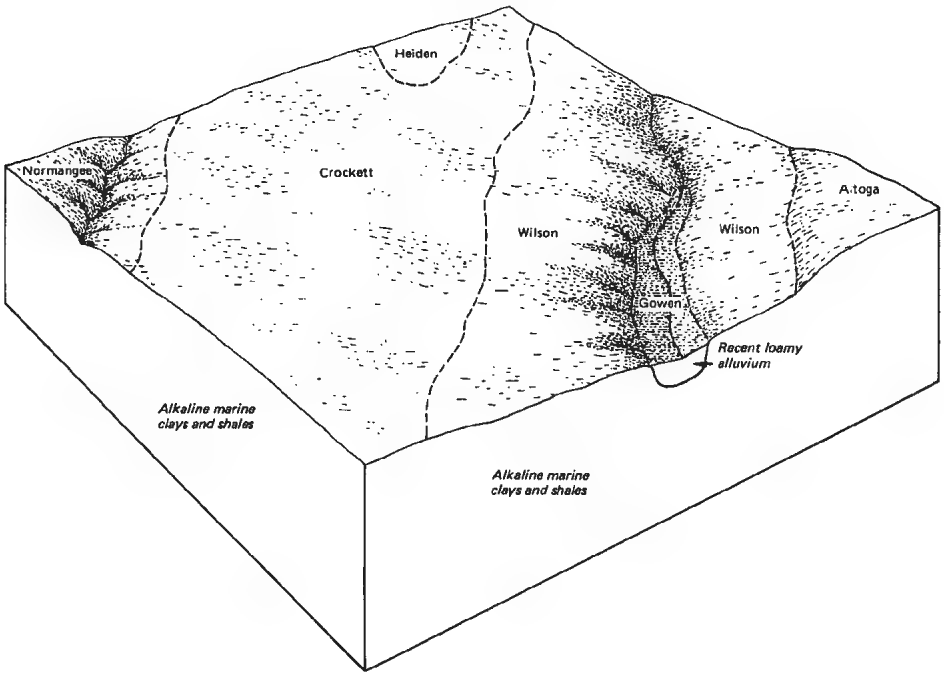

Figure 2.—Typical pattern of soils in the Crockett-Wilson map unit.

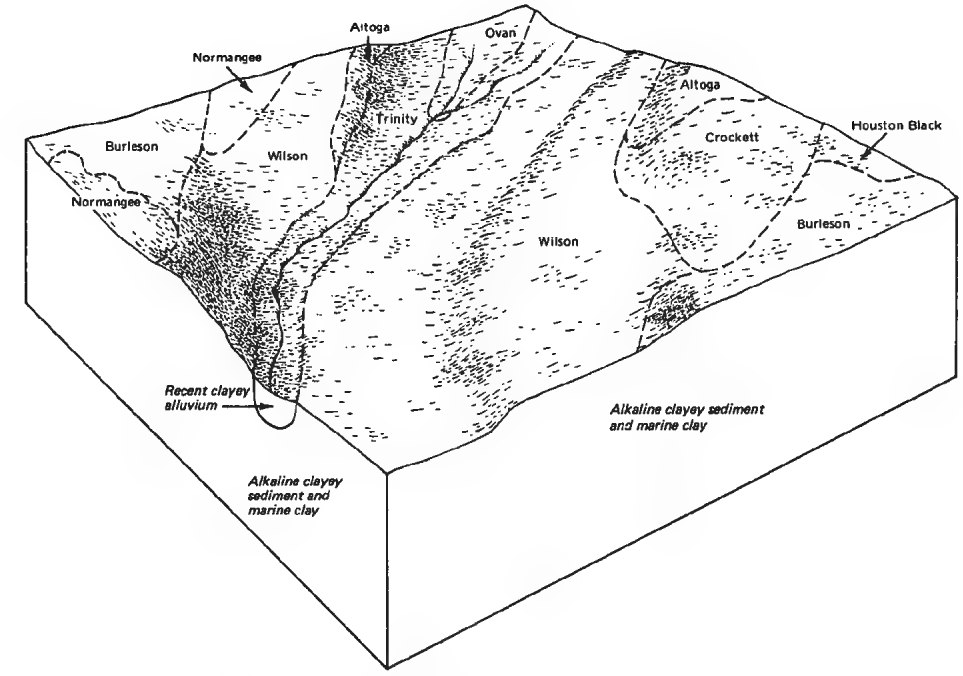

Figure 3.—Typical pattern of soils in the Wilson-Burleson map unit.

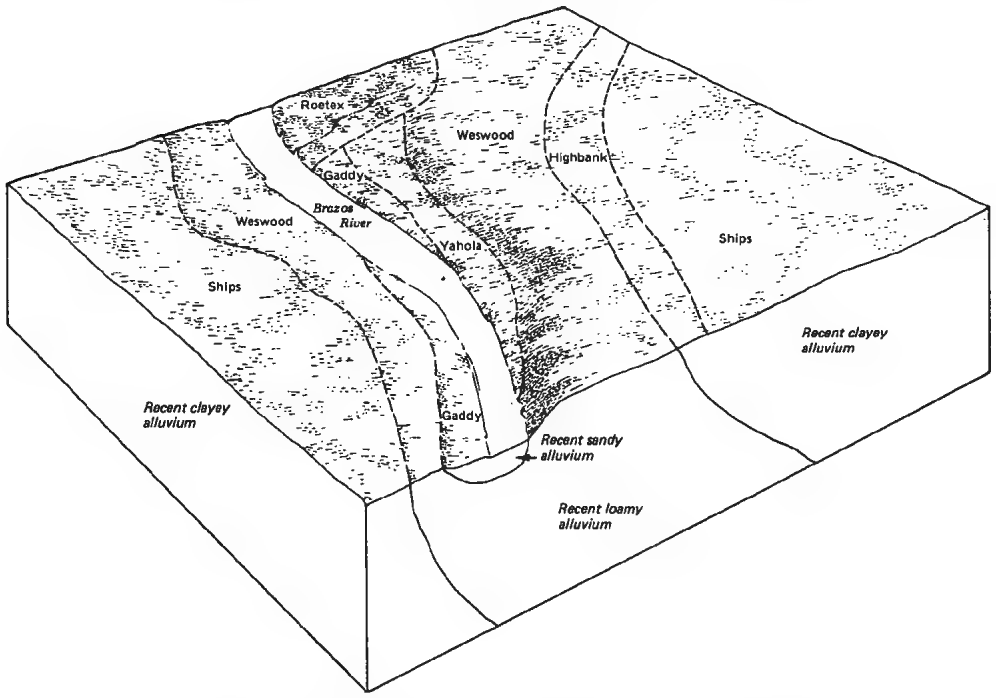

Figure 4.—Typical pattern of soils in the Ships-Weswood map unit.

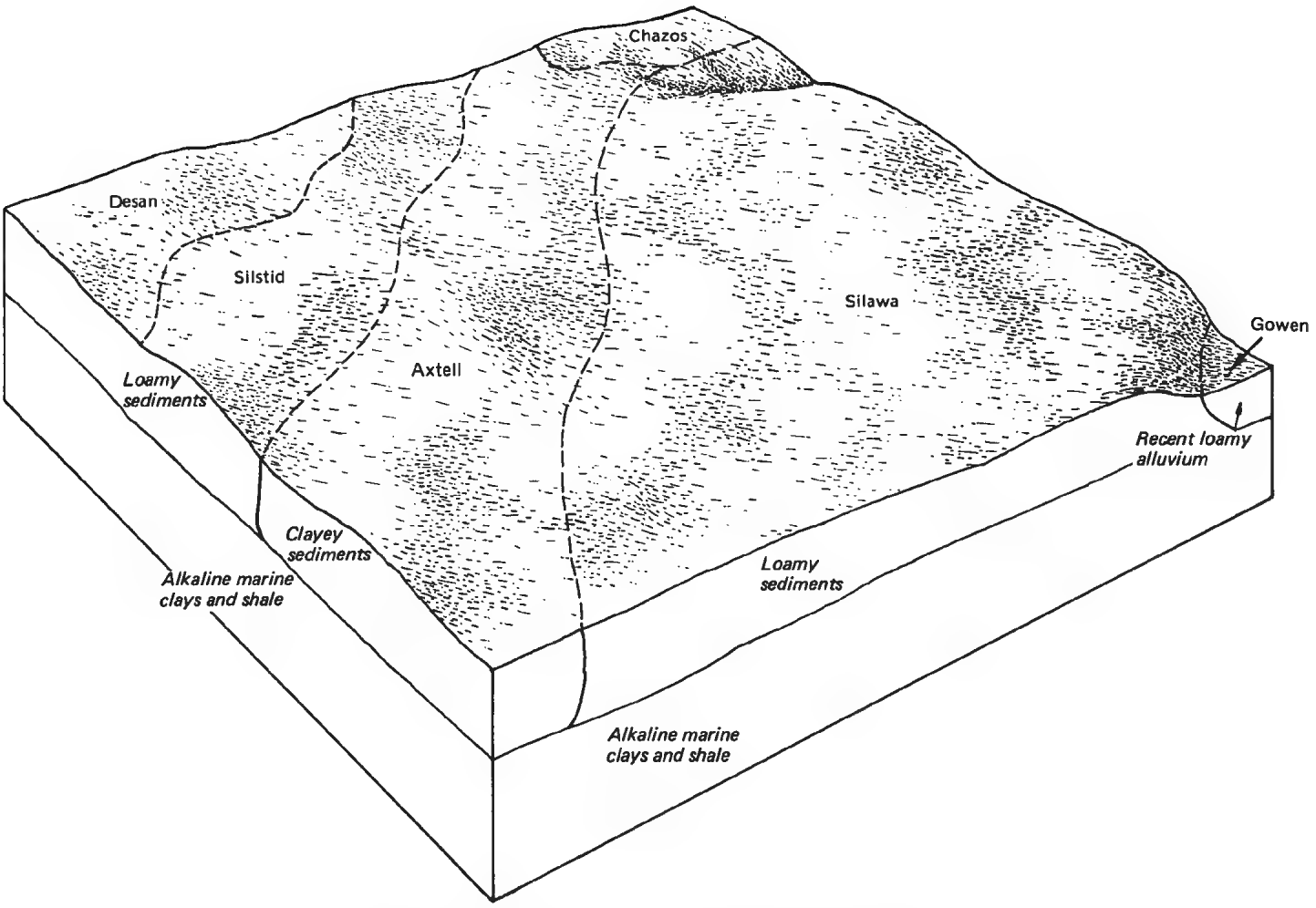

Figure 5.—Typical pattern of soils in the Silawa-Axtell map unit.

Figure 6.—Abandoned field invaded by mesquite trees. The soil is Axtell fine sandy loam, 0 to 1 percent slopes.

Figure 7.—Typical area of Axtell and Crockett soils, 2 to 8 percent slopes, severely eroded.

Figure 8.—Profile of Padina fine sand, 0 to 5 percent slopes.

Figure 9.—Ponded water standing on an area of Roetex clay, frequently flooded.

Figure 10.—Profile of Wilson silty clay loam, 0 to 1 percent slopes.

Figure 11.—Pecan orchard in an area of Ships clay.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Based on 1938-72, records at Riesel, Texas]

Month	Temperature		Precipitation								
				Probability of receiving--					Mean number of days with--		
	Average daily maximum	Average daily minimum	Average total	0.05 inch or more	1.00 inch or more	2.00 inches or more	3.00 inches or more	5.00 inches or more	0.10 inch or more	0.50 inch or more	1.00 inch or more
	°F	°F	In	Pct	Pct	Pct	Pct	Pct			
January--	58.1	37.1	2.07	90	75	48	22	4	4.1	1.4	0.4
February-	62.2	40.6	2.64	94	86	66	38	6	4.9	1.7	0.6
March----	69.4	46.3	2.52	89	72	51	37	10	4.1	1.5	0.7
April----	77.9	56.1	3.91	97	92	81	62	24	5.0	2.4	1.3
May------	83.7	63.1	4.26	99	98	85	62	30	5.5	3.1	1.4
June-----	90.3	69.6	3.33	89	84	66	46	24	4.4	2.4	1.1
July-----	94.3	72.8	1.85	69	53	31	19	8	2.5	1.0	0.6
August---	95.0	72.4	2.14	76	65	40	23	10	3.2	1.4	0.6
September	89.0	67.1	2.78	89	76	56	40	17	4.0	1.8	0.9
October--	80.2	57.2	2.76	83	72	56	40	17	3.6	1.7	0.9
November-	68.2	46.3	2.99	92	84	57	38	18	4.2	2.0	0.8
December-	60.9	39.9	2.60	93	79	56	41	8	4.3	1.9	0.7
Year---	77.4	55.7	33.85	--	--	--	--	--	49.8	22.3	10.0

TABLE 2.--POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP

Map unit	Percent of county	Cultivated farm crops	Pasture	Range	Urban uses	Recreation	Openland wildlife
1. Houston Black-Heiden.	33	High	High	High	Low: percs slowly, shrink-swell, corrosivity, low strength.	Low: percs slowly, too clayey.	Medium: insufficient cover.
2. Crockett-Wilson	22	Medium: erodes easily, droughty.	Medium: erodes easily, droughty.	High	Low: shrink-swell, low strength, percs slowly.	Medium: percs slowly.	High.
3. Wilson-Burleson	15	Medium: erodes easily, droughty.	Medium: erodes easily, droughty.	Medium: erodes easily.	Low: wetness, shrink-swell, percs slowly, corrosivity, low strength.	Low: wetness, percs slowly, too clayey.	Medium: insufficient cover.
4. Austin-Altoga	1	Medium: slope, erodes easily, depth to bedrock, droughty.	High	High	Low: percs slowly, shrink-swell, corrosivity.	Low: too clayey.	Medium: insufficient cover.
5. Ships-Weswood	12	High	High	High	Low: flooding, wetness, shrink-swell, low strength, percs slowly.	Low: flooding, too clayey.	High.
6. Gowen-Trinity	3	Medium: flooding.	High	High	Low: flooding, wetness, shrink-swell.	Low: flooding.	Medium: insufficient cover.
7. Ovan-Trinity	2	Medium: flooding, wetness.	High	High	Low: flooding, wetness, shrink-swell.	Low: flooding, too clayey, percs slowly.	Medium: insufficient cover.
8. Silawa-Axtell	9	Medium: erodes easily, droughty.	High	High	Low: shrink-swell, low strength, percs slowly.	High	High.
9. Axtell-Tabor	2	Medium: erodes easily, droughty.	High	High	Low: low strength, shrink-swell, percs slowly.	Medium: percs slowly.	Medium: insufficient cover.
10. Silstid-Padina	1	Low: droughty, soil blowing.	Medium: droughty.	Low: droughty.	High	Low: too sandy.	Low: insufficient water.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Aledo soils, 1 to 5 percent slopes	210	(1)
2	Altoga silty clay, 1 to 3 percent slopes	2,730	0.6
3	Altoga soils, 3 to 5 percent slopes, eroded	5,560	1.1
4	Altoga soils, 5 to 12 percent slopes, eroded	8,860	1.8
5	Austin silty clay, 1 to 3 percent slopes	1,690	0.3
6	Austin silty clay, 3 to 5 percent slopes, eroded	1,370	0.3
7	Axtell fine sandy loam, 0 to 1 percent slopes	910	0.2
8	Axtell fine sandy loam, 1 to 3 percent slopes	7,790	1.6
9	Axtell fine sandy loam, 2 to 5 percent slopes, eroded	5,470	1.1
10	Axtell and Crockett soils, 2 to 8 percent slopes, severely eroded	1,750	0.4
11	Bastrop fine sandy loam	570	0.1
12	Blum Variant fine sandy loam, 1 to 3 percent slopes	700	0.1
13	Branyon clay, 0 to 1 percent slopes	8,780	1.8
14	Branyon clay, 1 to 3 percent slopes	4,370	0.9
15	Bunyan fine sandy loam, frequently flooded	1,630	0.3
16	Burleson clay, 0 to 1 percent slopes	10,800	2.2
17	Burleson clay, 1 to 3 percent slopes	2,630	0.5
18	Chazos loamy fine sand, 1 to 5 percent slopes	5,170	1.1
19	Crockett fine sandy loam, 0 to 1 percent slopes	8,260	1.7
20	Crockett fine sandy loam, 1 to 3 percent slopes	19,150	3.9
21	Crockett fine sandy loam, 2 to 5 percent slopes, eroded	13,450	2.7
22	Desan loamy fine sand, 0 to 5 percent slopes	4,360	0.9
23	Eddy gravelly clay loam, 1 to 5 percent slopes	120	(1)
24	Ferris-Heiden complex, 5 to 12 percent slopes, severely eroded	5,440	1.1
25	Gaddy silt loam, occasionally flooded	950	0.2
26	Gaddy soils, frequently flooded	1,960	0.4
27	Gowen clay loam, occasionally flooded	2,030	0.4
28	Gowen clay loam, frequently flooded	10,600	2.2
29	Heiden clay, 1 to 3 percent slopes	22,830	4.7
30	Heiden clay, 3 to 5 percent slopes	8,190	1.7
31	Heiden clay, 2 to 5 percent slopes, eroded	17,310	3.5
32	Heiden-Ferris complex, 5 to 8 percent slopes, eroded	7,470	1.5
33	Highbank silty clay loam	1,990	0.4
34	Houston Black clay, 0 to 1 percent slopes	11,500	2.3
35	Houston Black clay, 1 to 3 percent slopes	45,800	9.4
36	Lewisville silty clay, 1 to 3 percent slopes	2,920	0.6
37	Lewisville silty clay, 3 to 5 percent slopes	3,550	0.7
38	Lott silty clay, 1 to 3 percent slopes	3,340	0.7
39	Lott silty clay, 3 to 5 percent slopes	3,720	0.8
40	Normangee clay loam, 0 to 1 percent slopes	320	0.1
41	Normangee clay loam, 1 to 3 percent slopes	2,960	0.6
42	Normangee clay loam, 2 to 5 percent slopes, eroded	4,780	1.0
43	Ovan silty clay, occasionally flooded	7,050	1.4
44	Ovan silty clay, frequently flooded	9,660	2.0
45	Padina fine sand, 0 to 5 percent slopes	3,480	0.7
46	Roetex clay, frequently flooded	2,380	0.5
47	Satin clay loam, 1 to 5 percent slopes	4,320	0.9
48	Ships clay	20,180	4.1
49	Ships clay, frequently flooded	4,540	0.9
50	Silawa loamy fine sand, 0 to 3 percent slopes	6,940	1.4
51	Silawa fine sandy loam, 1 to 3 percent slopes	4,440	0.9
52	Silawa fine sandy loam, 3 to 5 percent slopes	1,500	0.3
53	Silawa fine sandy loam, 3 to 8 percent slopes, eroded	4,310	0.9
54	Silstid loamy fine sand, 0 to 3 percent slopes	7,410	1.5
55	Stephen silty clay, 1 to 4 percent slopes	360	0.1
56	Tabor fine sandy loam, 0 to 1 percent slopes	1,490	0.3
57	Tabor fine sandy loam, 1 to 3 percent slopes	1,520	0.3
58	Trinity clay, occasionally flooded	2,280	0.5
59	Trinity clay, frequently flooded	15,600	3.2
60	Weswood silt loam, 0 to 1 percent slopes	3,820	0.8
61	Weswood silty clay loam, 0 to 1 percent slopes	12,090	2.5
62	Weswood complex, 0 to 8 percent slopes	1,160	0.2
63	Wilson loam, 0 to 1 percent slopes	12,490	2.6
64	Wilson loam, 1 to 3 percent slopes	9,820	2.0
65	Wilson silty clay loam, 0 to 1 percent slopes	34,100	7.0
66	Wilson silty clay loam, 1 to 3 percent slopes	31,560	6.4
67	Wilson silty clay loam, 2 to 5 percent slopes, eroded	5,690	1.2
68	Yahola fine sandy loam, occasionally flooded	4,950	1.0
	Water	2,470	0.5
	Total	489,600	100.0

[1]Less than 0.1 percent.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1975. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Cotton lint	Grain sorghum	Corn	Improved bermudagrass
	Lb	Bu	Bu	AUM[1]
Aledo:				
1	---	---	---	---
Altoga:				
2	275	50	35	7.0
23	225	35	25	5.0
24	---	---	---	3.5
Austin:				
5	350	75	50	6.5
6	250	60	35	6.0
Axtell:				
7	250	40	35	6.5
8	250	35	35	6.5
9	150	30	20	5.0
210	---	---	---	4.5
Bastrop:				
11	400	70	50	7.0
Blum Variant:				
12	400	60	45	8.0
Branyon:				
13	450	85	55	7.0
14	450	80	50	7.0
Bunyan:				
15	---	---	---	7.0
Burleson:				
16	400	85	50	7.0
17	450	80	50	7.0
Chazos:				
18	---	40	35	7.0
Crockett:				
19	400	58	45	7.5
20	350	54	40	7.5
21	200	45	30	5.5
Desan:				
22	---	---	30	4.5
Eddy:				
23	---	---	---	2.5
Ferris:				
224	---	---	---	3.5
Gaddy:				
25	250	30	25	6.0
226	---	---	---	5.5

See footnotes at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Grain sorghum	Corn	Improved bermudagrass
	Lb	Bu	Bu	AUM[1]
Gowen:				
27	500	70	50	8.0
28	---	---	---	8.0
Heiden:				
29	400	80	60	8.0
30	350	55	50	6.0
31	350	40	45	6.0
2 32	---	25	---	3.5
Highbank:				
33	525	90	70	9.0
Houston Black:				
34	500	90	60	8.0
35	450	85	55	8.0
Lewisville:				
36	500	80	59	7.5
37	375	70	55	7.0
Lott:				
38	400	80	70	6.5
39	350	70	60	6.0
Normangee:				
40	350	55	48	8.0
41	300	50	44	8.0
42	---	40	---	6.0
Ovan:				
43	450	100	60	8.0
44	---	---	---	8.0
Padina:				
2 45	---	---	30	4.5
Roetex:				
46	---	---	---	3.5
Satin:				
47	250	35	---	3.5
Ships:				
48	550	80	65	9.0
2 49	---	---	---	9.0
Silawa:				
50	325	45	50	5.5
51	395	50	55	6.0
52	335	40	45	5.5
53	---	---	---	4.5
Silstid:				
54	---	40	45	5.5

See footnotes at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Grain sorghum	Corn	Improved bermudagrass
	Lb	Bu	Bu	AUM[1]
Stephen:				
55	250	55	34	4.0
Tabor:				
56	250	50	40	6.0
57	250	55	40	6.0
Trinity:				
[3]58	450	90	60	8.0
59	---	---	---	8.0
Weswood:				
60, 61	500	90	75	9.0
[2]62	390	65	60	8.0
Wilson:				
63, 65	350	50	45	5.5
64, 66	300	40	35	5.5
67	250	35	25	5.0
Yahola:				
68	425	55	40	8.0

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.
[2]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.
[3]Yields are for areas protected from flooding.

TABLE 5.--CAPABILITY CLASSES AND SUBCLASSES

Class	Total Acreage	Major Management concerns (subclass)			
		Erosion (e)	Wetness (w)	Soil Problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	16,480	---	---	---	---
II	148,840	86,330	40,340	22,170	---
III	212,200	139,220	42,100	30,880	---
IV	46,980	42,540	---	4,440	---
V	46,370	---	46,370	---	---
VI	16,260	16,050	---	210	---
VII	---	---	---	---	---
VIII	---	---	---	---	---

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION

[Soils not listed are not in range sites; such soils can be used for grazing if grass cover is established]

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Aledo:					
1	Shallow	Favorable	3,000	Little bluestem	30
		Normal	2,000	Indiangrass	15
		Unfavorable	1,800	Sideoats grama	10
				Big bluestem	10
				Switchgrass	5
				Silver bluestem	5
				Hairy grama	5
				Hairy dropseed	5
				Texas wintergrass	5
				Other perennial forbs	5
				Other trees	5
Altoga:					
2, [1]3, [1]4	Clay Loam	Favorable	6,500	Little bluestem	35
		Normal	5,000	Big bluestem	20
		Unfavorable	3,800	Indiangrass	15
				Switchgrass	5
				Florida paspalum	5
				Virginia wildrye	5
				Sideoats grama	5
				Other perennial grasses	5
				Other perennial forbs	5
Austin:					
5, 6	Clay Loam	Favorable	6,500	Little bluestem	40
		Normal	5,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	15
				Sideoats grama	5
				Switchgrass	5
				Silver bluestem	5
				Texas wintergrass	5
				Other perennial forbs	5
				Other half shrubs	5
Axtell:					
7, 8, 9	Claypan Savannah	Favorable	5,000	Little bluestem	25
		Normal	3,500	Sideoats grama	15
		Unfavorable	2,500	Indiangrass	10
				Beaked panicum	5
				Purpletop	5
				Florida paspalum	5
				Tall dropseed	5
				Other trees	20
				Other perennial forbs	5
				Unknowns	5
[1]10:					
Axtell part	Claypan Savannah	Favorable	5,000	Little bluestem	25
		Normal	3,500	Sideoats grama	15
		Unfavorable	2,500	Indiangrass	10
				Beaked panicum	5
				Purpletop	5
				Florida paspalum	5
				Tall dropseed	5
				Other trees	20
				Other perennial forbs	5
				Unknowns	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Axtell:					
10:					
Crockett part	Claypan Prairie	Favorable	6,000	Little bluestem	10
		Normal	5,000	Indiangrass	10
		Unfavorable	3,000	Virginia wildrye	10
				Florida paspalum	10
				Sideoats grama	10
				Texas wintergrass	10
				Silver bluestem	10
				Paspalum	10
				Big bluestem	5
				Other perennial forbs	5
				Other trees	5
				Other perennial grasses	5
Bastrop:					
11	Sandy Loam	Favorable	5,000	Little bluestem	50
		Normal	4,000	Indiangrass	10
		Unfavorable	2,000	Switchgrass	5
				Purpletop	5
				Sideoats grama	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				Lindheimer hackberry	5
				Other perennial forbs	3
				Other annual forbs	2
Blum Variant:					
12	Sandy Loam	Favorable	6,000	Little bluestem	50
		Normal	4,500	Indiangrass	10
		Unfavorable	3,000	Switchgrass	5
				Big bluestem	5
				Sideoats grama	5
				Silver bluestem	5
				Other trees	15
				Other perennial forbs	5
Branyon:					
13, 14	Blackland	Favorable	7,000	Little bluestem	50
		Normal	5,500	Indiangrass	13
		Unfavorable	3,500	Big bluestem	12
				Other perennial grasses	10
				Other perennial forbs	10
				Other trees	5
Bunyan:					
15	Loamy Bottomland	Favorable	6,500	Indiangrass	20
		Normal	5,000	Switchgrass	15
		Unfavorable	3,500	Big bluestem	10
				Little bluestem	10
				Tall dropseed	5
				Texas wintergrass	5
				Sideoats grama	5
				Vine-mesquite	5
				Other perennial grasses	10
				Other trees	10
				Other perennial forbs	5
Burleson:					
16, 17	Blackland	Favorable	7,000	Little bluestem	40
		Normal	5,500	Indiangrass	15
		Unfavorable	4,000	Big bluestem	15
				Sideoats grama	5
				Texas wintergrass	5
				Silver bluestem	5
				Tall dropseed	5
				Other perennial grasses	5
				Other perennial forbs	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Chazos:					
18	Loamy Sand	Favorable	4,500	Little bluestem	40
		Normal	4,000	Switchgrass	5
		Unfavorable	3,000	Beaked Panicum	5
				Yellow Indiangrass	5
				Sand lovegrass	5
				Longleaf uniola	5
				Brown seed Paspalum	5
				Purpletop	5
				Other shrubs	5
				Panicum	5
				Other perennial forbs	5
				Blackjack oak	5
				Post oak	5
Crockett:					
19, 20, 21	Claypan Prairie	Favorable	6,000	Little bluestem	10
		Normal	5,000	Indiangrass	10
		Unfavorable	3,000	Virginia wildrye	10
				Florida paspalum	10
				Sideoats grama	10
				Texas wintergrass	10
				Silver bluestem	10
				Paspalum	10
				Big bluestem	5
				Other perennial forbs	5
				Other trees	5
				Other perennial grasses	5
Desan:					
22	Deep Sand	Favorable	3,000	Post oak	15
		Normal	2,000	Sand lovegrass	10
		Unfavorable	1,000	Blackjack oak	10
				Purpletop	5
				Indiangrass	5
				Red lovegrass	5
				Scribner panicum	5
				Fringeleaf paspalum	5
				Other perennial forbs	15
				Other trees	15
				Other annual grasses	10
Eddy:					
23	Chalky Ridge	Favorable	4,500	Little bluestem	30
		Normal	3,500	Indiangrass	15
		Unfavorable	2,000	Big bluestem	10
				Sideoats grama	10
				Texas wintergrass	5
				Silver bluestem	5
				Hairy grama	5
				Other perennial grasses	10
				Other perennial forbs	5
				Other trees	5
Ferris:					
[1]24:					
Ferris part	Eroded Blackland	Favorable	7,000	Little bluestem	30
		Normal	5,500	Indiangrass	15
		Unfavorable	4,000	Big bluestem	15
				Switchgrass	5
				Florida paspalum	5
				Eastern gamagrass	5
				Virginia wildrye	5
				Sideoats grama	5
				Texas wintergrass	5
				Meadow dropseed	5
				Other perennial forbs	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Ferris:					
[1]24:					
Heiden part	Blackland	Favorable	7,000	Little bluestem	50
		Normal	6,000	Big bluestem	15
		Unfavorable	3,500	Indiangrass	10
				Eastern gamagrass	2
				Switchgrass	2
				Sideoats grama	2
				Virginia wildrye	2
				Vine-mesquite	2
				Other perennial forbs	10
				Other trees	5
Gaddy:					
25, [1]26	Sandy Bottomland	Favorable	3,800	Switchgrass	30
		Normal	2,700	Sand bluestem	15
		Unfavorable	2,000	Indiangrass	15
				Little bluestem	5
				Texas bluegrass	5
				Beaked panicum	5
				Purpletop	5
				Goldenrod	5
				Heath aster	5
				Maximilian sunflower	5
				Other trees	5
Gowen:					
27, 28	Loamy Bottomland	Favorable	8,000	Indiangrass	20
		Normal	5,500	Big bluestem	15
		Unfavorable	4,000	Little bluestem	15
				Switchgrass	10
				Tall dropseed	5
				Sideoats grama	5
				Vine-mesquite	5
				Texas wintergrass	5
				Other perennial grasses	5
				Other perennial forbs	5
				Other shrubs	5
				Other trees	5
Heiden:					
29, 30, 31	Blackland	Favorable	7,000	Little bluestem	50
		Normal	6,000	Big bluestem	15
		Unfavorable	3,500	Indiangrass	10
				Eastern gamagrass	2
				Switchgrass	2
				Sideoats grama	2
				Virginia wildrye	2
				Vine-mesquite	2
				Other perennial forbs	10
				Other trees	5
[1]32:					
Heiden part	Blackland	Favorable	7,000	Little bluestem	50
		Normal	6,000	Big bluestem	15
		Unfavorable	3,500	Indiangrass	10
				Eastern gamagrass	2
				Switchgrass	2
				Sideoats grama	2
				Virginia wildrye	2
				Vine-mesquite	2
				Other perennial forbs	10
				Other trees	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Heiden:					
[1]32:					
Ferris part	Eroded Blackland	Favorable	7,000	Little bluestem	30
		Normal	5,500	Indiangrass	15
		Unfavorable	4,000	Big bluestem	15
				Switchgrass	5
				Florida paspalum	5
				Eastern gamagrass	5
				Virginia wildrye	5
				Sideoats grama	5
				Texas wintergrass	5
				Meadow dropseed	5
				Other perennial forbs	5
Highbank:					
33	Loamy Bottomland	Favorable	8,000	Virginia wildrye	25
		Normal	6,500	Beaked panicum	10
		Unfavorable	5,000	Indiangrass	10
				Little bluestem	10
				Switchgrass	10
				Big bluestem	5
				Rustyseed paspalum	5
				Other perennial forbs	10
				Other perennial grasses	10
				Other trees	5
Houston Black:					
34, 35	Blackland	Favorable	7,000	Little bluestem	50
		Normal	6,000	Indiangrass	25
		Unfavorable	3,500	Switchgrass	5
				Sideoats grama	5
				Vine-mesquite	5
				Other shrubs	5
				Other annual forbs	5
Lewisville:					
36, 37	Clay Loam	Favorable	6,500	Little bluestem	20
		Normal	5,500	Indiangrass	15
		Unfavorable	3,500	Big bluestem	15
				Switchgrass	10
				Texas wintergrass	5
				Virginia wildrye	5
				Silver bluestem	5
				Meadow dropseed	5
				Buffalograss	5
				Sideoats grama	5
				Other perennial forbs	5
				Other trees	5
Lott:					
38, 39	Clay Loam	Favorable	6,500	Little bluestem	40
		Normal	5,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	15
				Sideoats grama	5
				Switchgrass	5
				Silver bluestem	5
				Texas wintergrass	5
				Other perennial forbs	5
				Other half shrubs	5
Normangee:					
40, 41, 42	Claypan Prairie	Favorable	5,500	Little bluestem	45
		Normal	4,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Switchgrass	10
				Florida paspalum	5
				Sideoats grama	5
				Other perennial forbs	5
				Other trees	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Ovan:					
43, 44	Clayey Bottomland	Favorable	7,500	Little bluestem	40
		Normal	6,000	Canada wildrye	15
		Unfavorable	4,000	Big bluestem	10
				Purpletop	10
				Texas wintergrass	5
				American elm	5
				Pecan	5
				Other annual forbs	5
				Other trees	5
Padina:					
145	Deep Sand	Favorable	3,000	Little bluestem	20
		Normal	2,000	Post oak	5
		Unfavorable	1,000	Sand lovegrass	5
				Blackjack oak	5
				Purpletop	10
				Yellow Indiangrass	5
				Switchgrass	5
				Panicum	10
				Paspalum	10
				Other perennial forbs	5
				Longleaf uniola	5
				Bluejack oak	5
				Splitbeard bluestem	5
				Other trees	5
Roetex:					
46	Clayey Bottomland	Favorable	6,000	Virginia wildrye	15
		Normal	5,000	Sedge	15
		Unfavorable	3,000	Eastern gamagrass	10
				Beaked panicum	10
				Broadleaf uniola	10
				Florida paspalum	10
				Switchgrass	5
				Indiangrass	5
				Big bluestem	5
				Other perennial forbs	5
				Other perennial grasses	5
				Other trees	5
Satin:					
47	Gravelly Loam	Favorable	4,500	Little bluestem	45
		Normal	3,500	Indiangrass	10
		Unfavorable	2,000	Sideoats grama	5
				Silver bluestem	5
				Texas wintergrass	5
				Tall dropseed	5
				Hairy grama	5
				Other perennial forbs	10
				Other perennial grasses	5
				Other trees	5
Ships:					
48, 149	Clayey Bottomland	Favorable	7,500	Virginia wildrye	15
		Normal	6,000	Beaked panicum	15
		Unfavorable	4,500	Broadleaf uniola	10
				Indiangrass	5
				Switchgrass	5
				Little bluestem	5
				Rustyseed paspalum	5
				Eastern gamagrass	5
				Other perennial grasslikes	15
				Other trees	15
				Other perennial forbs	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Silawa:					
50	Loamy Sand	Favorable	6,000	Little bluestem	50
		Normal	5,000	Indiangrass	10
		Unfavorable	3,000	Switchgrass	5
				Purpletop	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				American beautyberry	5
				Other perennial forbs	5
				Other annual grasses	5
51, 52, 53	Sandy Loam	Favorable	5,500	Little bluestem	50
		Normal	4,500	Indiangrass	10
		Unfavorable	2,500	Switchgrass	5
				Purpletop	5
				Sideoats grama	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				Hackberry	5
				Other perennial forbs	3
				Other annual grasses	2
Silstid:					
54	Sandy	Favorable	4,500	Little bluestem	50
		Normal	4,000	Indiangrass	10
		Unfavorable	2,000	Crinkleawn	5
				Purpletop	5
				Switchgrass	5
				Fringeleaf paspalum	5
				Post oak	5
				Blackjack oak	5
				Other annual grasses	5
				Other perennial forbs	5
Stephen:					
55	Chalky Ridge	Favorable	4,500	Little bluestem	30
		Normal	3,500	Indiangrass	15
		Unfavorable	2,000	Big bluestem	10
				Sideoats grama	10
				Texas wintergrass	5
				Silver bluestem	5
				Hairy grama	5
				Other perennial grasses	10
				Other perennial forbs	5
				Other trees	5
Tabor:					
56, 57	Sandy Loam	Favorable	6,500	Little bluestem	50
		Normal	5,500	Indiangrass	10
		Unfavorable	3,500	Blackjack oak	10
				Post oak	10
				Purpletop	5
				Brownseed paspalum	5
				Other trees	5
				Other perennial grasses	5
Trinity:					
58, 59	Clayey Bottomland	Favorable	6,500	Virginia wildrye	15
		Normal	4,000	Sedge	15
		Unfavorable	3,000	Eastern gamagrass	10
				Switchgrass	10
				Indiangrass	10
				Giant cane	5
				Beaked panicum	5
				Panicum	5
				Other trees	20
				Other perennial forbs	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Weswood:					
60, 61, [1]62	Loamy Bottomland	Favorable	6,000	Indiangrass	20
		Normal	5,000	Switchgrass	15
		Unfavorable	4,000	Big bluestem	10
				Little bluestem	10
				Canada wildrye	5
				Texas wintergrass	5
				Sideoats grama	5
				Vine-mesquite	5
				Other trees	10
				Other perennial grasses	10
				Other perennial forbs	5
Wilson:					
63, 64, 65, 66, 67	Claypan Prairie	Favorable	6,000	Little bluestem	45
		Normal	4,500	Indiangrass	10
		Unfavorable	3,000	Big bluestem	10
				Virginia wildrye	5
				Vine-mesquite	5
				Florida paspalum	5
				Sideoats grama	5
				Texas wintergrass	5
				Silver bluestem	5
				Other perennial forbs	5
Yahola:					
68	Loamy Bottomland	Favorable	7,000	Big bluestem	25
		Normal	4,900	Indiangrass	15
		Unfavorable	3,500	Switchgrass	15
				Little bluestem	10
				Eastern gamagrass	5
				Tall dropseed	5
				Beaked panicum	5
				Compassplant	5
				Sedge	5
				Heath aster	5
				Other trees	5

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Aledo: 1	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Altoga: 2, 13, 14	Moderate: too clayey.	Severe: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
Austin: 5, 6	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Axtell: 7, 8, 9	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
10: Axtell part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Crockett part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, corrosive, low strength.	Severe: shrink-swell, low strength.
Bastrop: 11	Slight	Slight	Slight	Slight	Moderate: low strength.
Blum Variant: 12	Severe: depth to rock.	Moderate: shrink-swell.	Severe: depth to rock.	Severe: depth to rock.	Moderate: low strength.
Branyon: 13, 14	Severe: too clayey, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Bunyan: 15	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Burleson: 16, 17	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, corrosive.	Severe: shrink-swell.
Chazos: 18	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Crockett: 19, 20, 21	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, corrosive, low strength.	Severe: shrink-swell, low strength.
Desan: 22	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Eddy: 23	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
Ferris: [1]24:					
Ferris part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Heiden part	Severe: cutbanks cave, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Gaddy: 25	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
[1]26	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Gowen: 27	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.	Moderate: shrink-swell, floods.
28	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Heiden: 29, 30, 31	Severe: cutbanks cave, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
[1]32:					
Heiden part	Severe: cutbanks cave, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Ferris part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Highbank: 33	Severe: too clayey.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.
Houston Black: 34, 35	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Lewisville: 36, 37	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
Lott: 38, 39	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Normangee: 40, 41, 42	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, corrosive.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ovan:					
43	Severe: too clayey.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
44	Severe: too clayey.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
Padina:					
145	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight.
Roetex:					
46	Severe: too clayey, floods.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: shrink-swell, wetness.
Satin:					
47	Severe: too clayey, small stones.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Ships:					
48	Severe: too clayey.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: shrink-swell.
149	Severe: too clayey, floods.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: shrink-swell, floods.
Silawa:					
50, 51	Slight	Slight	Slight	Slight	Moderate: low strength.
52, 53	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Silstid:					
54	Moderate: cutbanks cave.	Slight	Slight	Slight	Slight.
Stephen:					
55	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.
Tabor:					
56, 57	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Trinity:					
58	Severe: wetness, too clayey.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.
59	Severe: wetness, floods, too clayey.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell.
Weswood:					
60	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength.
61	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.
162	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Wilson: 63, 64, 65, 66, 67-	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Yahola: 68	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 8.--SANITARY FACILITIES

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Aledo:					
1	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, small stones.
Altoga:					
2, [1]3	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
[1]4	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
Austin:					
5, 6	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
Axtell:					
7	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
8, 9	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
[1]10:					
Axtell part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Crockett part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Bastrop:					
11	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Blum Variant:					
12	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Branyon:					
13	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
14	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Bunyan:					
15	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Burleson:					
16	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
17	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Chazos:					
18	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Poor: thin layer.
Crockett:					
19	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Crockett:					
20, 21	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Desan:					
22	Slight	Severe: seepage.	Moderate: too sandy.	Moderate: seepage.	Poor: too sandy.
Eddy:					
23	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Ferris:					
[1]24:					
Ferris part	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Heiden part	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Gaddy:					
25, [1]26	Severe: floods.	Severe: seepage, floods.	Severe: seepage, too sandy, floods.	Severe: floods, seepage.	Fair: too sandy.
Gowen:					
27	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
28	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
Heiden:					
29, 30, 31	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
[1]32:					
Heiden part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Ferris part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Highbank:					
33	Severe: percs slowly.	Slight	Severe: too clayey, floods.	Severe: floods.	Fair: thin layer.
Houston Black:					
34	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
35	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Lewisville:					
36, 37	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Fair: too clayey.
Lott:					
38, 39	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
Normangee:					
40	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
41, 42	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ovan:					
43	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey.
44	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey.
Padina:					
[1]45	Moderate: percs slowly.	Severe: seepage.	Moderate: too sandy, wetness.	Moderate: seepage.	Poor: too sandy.
Roetex:					
46	Severe: percs slowly, floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
Satin:					
47	Severe: percs slowly.	Moderate: small stones, slope.	Severe: too clayey.	Slight	Poor: too clayey, small stones.
Ships:					
48	Severe: percs slowly.	Slight	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
[1]49	Severe: percs slowly, floods.	Severe: floods.	Severe: too clayey, floods.	Severe: floods.	Poor: too clayey.
Silawa:					
50, 51, 52, 53	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
Silstid:					
54	Slight	Moderate: seepage.	Slight	Slight	Poor: too sandy.
Stephen:					
55	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey.
Tabor:					
56	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: thin layer, too clayey.
57	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: thin layer, too clayey.
Trinity:					
58	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
59	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey.
Weswood:					
60	Moderate: floods.	Moderate: seepage.	Moderate: floods.	Moderate: floods.	Good.
61	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Weswood:					
[1]62	Moderate: floods.	Moderate: seepage, slope.	Moderate: floods.	Moderate: floods.	Fair: too clayey.
Wilson:					
63, 65	Severe: percs slowly.	Slight	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
64, 66, 67	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
Yahola:					
68	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 9.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor"]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Aledo:				
1	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, small stones.
Altoga:				
2, 13, 14	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Austin:				
5, 6	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Axtell:				
7, 8, 9	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
[1]10:				
Axtell part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Crockett part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Bastrop:				
11	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Blum Variant:				
12	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Branyon:				
13, 14	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Bunyan:				
15	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Burleson:				
16, 17	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Chazos:				
18	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Crockett:				
19, 20, 21	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Desan:				
22	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Eddy:				
23	Fair: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, excess lime.
Ferris:				
[1]24:				
Ferris part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Heiden part	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Gaddy:				
25	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
[1]26	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Gowen:				
27, 28	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Heiden:				
29, 30, 31	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
[1]32:				
Heiden part	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Ferris part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Highbank:				
33	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Houston Black:				
34, 35	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Lewisville:				
36, 37	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Lott:				
38, 39	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Normangee:				
40, 41, 42	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Ovan:				
43, 44	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Padina:				
[1]45	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Roetex: 46	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Satin: 47	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, small stones.
Ships: 48, [1]49	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Silawa: 50	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
51, 52, 53	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Silstid: 54	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Stephen: 55	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Tabor: 56, 57	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Trinity: 58, 59	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Weswood: 60	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
61, [1]62	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Wilson: 63, 64, 65, 66, 67	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Yahola: 68	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 10.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Aledo: 1	Severe: depth to rock.	Severe: thin layer.	Depth to rock	Rooting depth, droughty.	Depth to rock, rooting depth.	Droughty, rooting depth.
Altoga: 2, 13, 14	Moderate: seepage.	Moderate: unstable fill.	Not needed	Complex slope, erodes easily.	Favorable	Favorable.
Austin: 5, 6	Severe: depth to rock.	Moderate: compressible.	Not needed	Slow intake	Favorable	Favorable.
Axtell: 7, 8, 9	Slight	Moderate: unstable fill.	Complex slope, percs slowly.	Percs slowly, slow intake.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
110: Axtell part	Slight	Moderate: unstable fill.	Complex slope, percs slowly.	Percs slowly, slow intake.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Crockett part	Slight	Moderate: unstable fill, compressible.	Not needed	Percs slowly, rooting depth, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Bastrop: 11	Moderate: seepage.	Moderate: piping.	Not needed	Favorable	Favorable	Favorable.
Blum Variant: 12	Severe: depth to rock.	Moderate: low strength.	Depth to rock, percs slowly.	Percs slowly	Favorable	Favorable.
Branyon: 13, 14	Slight	Moderate: compressible, piping.	Percs slowly, cutbanks cave.	Percs slowly	Percs slowly	Percs slowly.
Bunyan: 15	Moderate: seepage.	Moderate: piping.	Not needed	Floods	Not needed	Favorable.
Burleson: 16, 17	Slight	Moderate: unstable fill, hard to pack.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
Chazos: 18	Slight	Moderate: erodes easily.	Percs slowly	Percs slowly, soil blowing.	Piping, erodes easily.	Erodes easily.
Crockett: 19, 20, 21	Slight	Moderate: unstable fill, compressible.	Not needed	Percs slowly, rooting depth, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Desan: 22	Severe: seepage.	Moderate: seepage, piping.	Not needed	Fast intake, soil blowing.	Piping, erodes easily.	Droughty, erodes easily.
Eddy: 23	Severe: depth to rock.	Severe: thin layer.	Not needed	Rooting depth, droughty.	Depth to rock, rooting depth.	Droughty, rooting depth.
Ferris: 124: Ferris part	Slight	Moderate: unstable fill.	Not needed	Percs slowly, slow intake.	Percs slowly, erodes easily.	Percs slowly, erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ferris:						
[1]24:						
Heiden part	Slight	Moderate: unstable fill, shrink-swell.	Not needed	Slow intake, slope.	Slope	Percs slowly, slope.
Gaddy:						
25, [1]26	Severe: seepage.	Moderate: unstable fill, piping.	Not needed	Seepage	Erodes easily	Erodes easily.
Gowen:						
27	Moderate: seepage.	Moderate: compressible.	Not needed	Favorable	Favorable	Favorable.
28	Moderate: seepage.	Moderate: compressible.	Not needed	Floods	Wetness	Favorable.
Heiden:						
29, 30, 31	Slight	Moderate: unstable fill, shrink-swell.	Not needed	Slow intake	Percs slowly	Percs slowly.
[1]32:						
Heiden part	Slight	Moderate: unstable fill, shrink-swell.	Not needed	Slow intake, slope.	Slope	Percs slowly, slope.
Ferris part	Slight	Moderate: unstable fill.	Not needed	Percs slowly, slow intake.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Highbank:						
33	Slight	Moderate: compressible.	Percs slowly	Percs slowly	Not needed	Favorable.
Houston Black:						
34, 35	Slight	Moderate: compressible, unstable fill.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
Lewisville:						
36, 37	Moderate: seepage.	Moderate: unstable fill.	Favorable	Favorable	Favorable	Favorable.
Lott:						
38, 39	Moderate: seepage.	Moderate: compressible.	Not needed	Slow intake	Favorable	Favorable.
Normangee:						
40, 41, 42	Slight	Moderate: unstable fill.	Not needed	Percs slowly, slow intake, erodes easily.	Slow intake, erodes easily, percs slowly.	Percs slowly, erodes easily.
Ovan:						
43, 44	Slight	Moderate: low strength.	Not needed	Slow intake	Percs slowly	Percs slowly.
Padina:						
[1]45	Severe: seepage.	Moderate: seepage, piping.	Cutbanks cave	Fast intake, soil blowing.	Piping, erodes easily.	Droughty.
Roetex:						
46	Slight	Moderate: compressible.	Percs slowly, wetness.	Slow intake, wetness.	Not needed	Percs slowly, wetness.
Satin:						
47	Slight	Moderate: low strength.	Not needed	Slow intake, droughty.	Not needed	Droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ships: 48, [1]49	Slight	Moderate: compressible.	Percs slowly	Slow intake, percs slowly.	Percs slowly	Percs slowly.
Silawa: 50, 51, 52, 53	Severe: seepage.	Moderate: piping, erodes easily.	Not needed	Erodes easily	Erodes easily	Erodes easily.
Silstid: 54	Moderate: seepage.	Moderate: piping.	Not needed	Erodes easily, seepage.	Too sandy	Erodes easily.
Stephen: 55	Severe: depth to rock.	Severe: thin layer.	Not needed	Droughty, rooting depth.	Depth to rock, rooting depth.	Droughty, rooting depth.
Tabor: 56, 57	Slight: favorable.	Moderate: unstable fill.	Not needed	Slow intake	Percs slowly	Percs slowly.
Trinity: 58	Slight	Moderate: compressible, unstable fill.	Percs slowly	Percs slowly, wetness.	Wetness	Wetness, percs slowly.
59	Slight	Moderate: compressible, unstable fill.	Percs slowly, floods.	Percs slowly, floods, wetness.	Floods, wetness, percs slowly.	Floods, wetness, percs slowly.
Weswood: 60, 61, [1]62	Moderate: seepage.	Moderate: piping, erodes easily.	Not needed	Favorable	Favorable	Favorable.
Wilson: 63, 64, 65, 66, 67	Slight	Moderate: unstable fill.	Percs slowly	Percs slowly, slow intake.	Percs slowly	Percs slowly.
Yahola: 68	Severe: seepage.	Moderate: unstable fill, seepage, piping.	Not needed	Floods	Not needed	Not needed.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 11.--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Aledo:				
1	Moderate: small stones.	Slight	Severe: depth to rock, small stones.	Slight.
Altoga:				
2, [1]3	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
[1]4	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
Austin:				
5, 6	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Axtell:				
7, 8, 9	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
[1]10:				
Axtell part	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Crockett part	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Bastrop:				
11	Slight	Slight	Slight	Slight.
Blum Variant:				
12	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Branyon:				
13, 14	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Bunyan:				
15	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Burleson:				
16, 17	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Chazos:				
18	Moderate: percs slowly.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Crockett:				
19, 20, 21	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Desan:				
22	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, soil blowing.	Severe: too sandy.
Eddy:				
23	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: depth to rock.	Moderate: small stones, too clayey.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ferris:				
124:				
Ferris part	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly, slope.	Severe: too clayey.
Heiden part	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
Gaddy:				
25	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
126	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Gowen:				
27	Severe: floods.	Moderate: floods.	Moderate: too clayey, floods.	Moderate: too clayey.
28	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: too clayey, floods.
Heiden:				
29, 30, 31	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
132:				
Heiden part	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
Ferris part	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly, slope.	Severe: too clayey.
Highbank:				
33	Moderate: percs slowly.	Moderate: too clayey.	Moderate: percs slowly, too clayey.	Moderate: too clayey.
Houston Black:				
34, 35	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Lewisville:				
36, 37	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Lott:				
38, 39	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Normangee:				
40, 41, 42	Severe: percs slowly.	Moderate: too clayey.	Severe: percs slowly.	Moderate: too clayey.
Ovan:				
43	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: too clayey.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ovan:				
44	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: too clayey.
Padina:				
[1]45	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Roetex:				
46	Severe: too clayey, floods.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey, wetness.
Satin:				
47	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Moderate: too clayey, percs slowly.	Moderate: too clayey.
Ships:				
48, [1]49	Severe: floods, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Silawa:				
50	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
51, 52, 53	Slight	Slight	Moderate: slope.	Slight.
Silstid:				
54	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Stephen:				
55	Severe: too clayey.	Severe: too clayey.	Severe: depth to rock, too clayey.	Severe: too clayey.
Tabor:				
56, 57	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Moderate: wetness.
Trinity:				
58	Severe: wetness, percs slowly.	Severe: too clayey.	Severe: wetness, too clayey.	Severe: too clayey.
59	Severe: wetness, floods, percs slowly.	Severe: floods, too clayey.	Severe: wetness, floods, percs slowly.	Severe: floods, too clayey.
Weswood:				
60	Slight	Slight	Slight	Slight.
61	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
[1]62	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope.	Moderate: too clayey.
Wilson:				
63, 64, 65, 66, 67	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Yahola: 68	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor"]

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Aledo: 1	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Very poor.	Poor.
Altoga: 2, [1]3	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
[1]4	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Very poor.	Fair.
Austin: 5, 6	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Axtell: 7, 8, 9	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Very poor.	Good.
[1]10:									
Axtell part	Poor	Fair	Good	Good	Poor	Very poor.	Fair	Very poor.	Good.
Crockett part	Poor	Fair	Good	Good	Poor	Very poor.	Fair	Very poor.	Good.
Bastrop: 11	Good	Fair	Good	Good	Poor	Very poor.	Good	Very poor.	Good.
Blum Variant: 12	Fair	Good	Good	Good	Poor	Poor	Good	Poor	Good.
Branyon: 13, 14	Good	Good	Poor	Fair	Poor	Poor	Fair	Poor	Fair.
Bunyan: 15	Very poor.	Poor	Fair	Good	Poor	Very poor.	Poor	Very poor.	Fair.
Burleson: 16, 17	Good	Good	Poor	Poor	Very poor.	Very poor.	Fair	Very poor.	Poor.
Chazos: 18	Fair	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Good.
Crockett: 19, 20, 21	Fair	Good	Good	Good	Poor	Poor	Good	Poor	Good.
Desan: 22	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Eddy: 23	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Very poor.	Poor.
Ferris: [1]24:									
Ferris part	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Very poor.	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Ferris:									
[1]24:									
Heiden part	Poor	Fair	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Gaddy:									
25	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Very poor.	Fair.
[1]26	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Very poor.	Fair.
Gowen:									
27	Good	Good	Fair	Good	Poor	Very poor.	Good	Very poor.	Fair.
28	Very poor.	Poor	Fair	Good	Poor	Very poor.	Poor	Very poor.	Fair.
Heiden:									
29	Good	Good	Fair	Fair	Poor	Very poor.	Good	Very poor.	Fair.
30, 31	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
[1]32:									
Heiden part	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Ferris part	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Very poor.	Fair.
Highbank:									
33	Good	Good	Fair	Fair	Poor	Very poor.	Good	Very poor.	Fair.
Houston Black:									
34, 35	Good	Good	Poor	Fair	Poor	Poor	Fair	Poor	Fair.
Lewisville:									
36, 37	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Lott:									
38	Good	Good	Fair	Fair	Poor	Very poor.	Good	Very poor.	Fair.
39	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Normangee:									
40, 41, 42	Fair	Good	Fair	Good	Poor	Poor	Fair	Poor	Fair.
Ovan:									
43	Fair	Fair	Poor	Fair	Poor	Good	Fair	Fair	Poor.
44	Poor	Poor	Fair	Fair	Poor	Good	Poor	Fair	Poor.
Padina:									
[1]45	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Roetex:									
46	Very poor.	Poor	Fair	Fair	Poor	Good	Poor	Fair	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Satin:									
47	Poor	Poor	Fair	Fair	Poor	Very poor.	Poor	Very poor.	Fair.
Ships:									
48	Good	Good	Fair	Fair	Poor	Poor	Good	Poor	Fair.
[1]49	Very poor.	Poor	Fair	Fair	Poor	Poor	Poor	Poor	Fair.
Silawa:									
50	Fair	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Good.
51	Good	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Good.
52	Fair	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Good.
53	Fair	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Good.
Silstid:									
54	Poor	Poor	Fair	Good	Poor	Very poor.	Poor	Very poor.	Fair.
Stephen:									
55	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Very poor.	Fair.
Tabor:									
56, 57	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Very poor.	Good.
Trinity:									
58	Fair	Good	Fair	Fair	Poor	Fair	Fair	Poor	Fair.
59	Poor	Fair	Fair	Fair	Poor	Fair	Fair	Poor	Fair.
Weswood:									
60, 61	Good	Good	Fair	Good	Poor	Very poor.	Good	Very poor.	Fair.
[1]62	Fair	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Fair.
Wilson:									
63, 64, 65, 66	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair.
67	Fair	Fair	Good	Fair	Poor	Poor	Fair	Poor	Fair.
Yahola:									
68	Good	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Good.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 13.--GARDENING AND LANDSCAPING

Soil series and map symbol	Flowers	Shrubs	Trees
Aledo: 1	Canna, calendula, dahlia, chrysanthemum, iris, gladiolus, geranium, zinnia.	Barbados-cherry, bottlebrush, bridalwreath, goldflower, guava, oleander.	(2).
Altoga: 2, [1]3, [1]4	Chrysanthemum, calendula, gladiolus, geranium, zinnia, petunia, verbena, canna.	Duranta, goldflower, briadalwreath, barbados-cherry, crapemyrtle, ligustrum, guava, jasmine.	Arborvitae, Arizona ash, live oak, magnolia, peach, pecan, plum, sycamore.
Austin: 5, 6	Gladiolus, petunia, iris, zinnia, larkspur, daylily, snapdragon, chrysanthemum.	Barbados-cherry, bottlebrush, bougainvillaea, bridalwreath, duranta, goldflower, guava, jasmine.	American elm, halepensis, live oak, magnolia, pecan, plum, arborvitae, sycamore.
Axtell: 7, 8, 9, [1]10	Aster, canna, zinnia, dahlia, petunia, gladiolus, pansy, geranium.	Pyracantha, oleander, gardenia, butterflybush, camellia, barbados-cherry, jasmine.	Halepensis, live oak, magnolia, American elm, cedrus deodara, pecan, plum, sycamore.
Bastrop: 11	Phlox, begonia, canna, petunia, geranium, iris, rose, narcissus.	Jasmine, hydrangea, camellia, oleander, goldflower, gardenia, pyracantha.	Arizona ash, cedrus deodara, American elm, Japanese black pine, magnolia, live oak, plum, pecan.
Blum Variant: 12	Gladiolus, rose, petunia, pansy, stock, snapdragon, verbena, zinnia.	Bottlebrush, duranta, oleander, jasmine, butterflybush, gardenia, goldflower, pyracantha.	Cedrus deodara, Japanese black pine, pecan, arborvitae, Arizona ash, American elm, live oak, magnolia.
Branyon: 13, 14	Marigold, petunia, zinnia, dahlia, calendula, chrysanthemum, geranium, iris.	Barbados-cherry, bottlebrush, bridalwreath, duranta, guava, goldflower, crapemyrtle, ligustrum.	Arborvitae, Arizona ash, American elm, halepensis, Japanese black pine, live oak, peach, plum.
Bunyan: 15	Caladium, marigold, canna, hibiscus, dahlia, gladiolus.	Bottlebrush, bridalwreath, goldflower, duranta, oleander, hydrangea, jasmine, barbados-cherry.	Halepensis, arborvitae, Japanese black elm, Arizona ash, American elm, pecan, plum, peach.
Burleson: 16, 17	Marigold, hibiscus, canna, gladiolus, daylily, pansy, petunia, zinnia.	Guava, crapemyrtle, bottlebrush, bridalwreath, ligustrum, duranta, panasgrass, goldflower.	Arizona ash, American elm, Japanese black pine, halepensis, arborvitae, peach, plum, pecan.
Chazos: 18	Agapanthus, aster, caladium, canna, cornflower, gladiolus, hibiscus, hyacinth.	Azalea, oleander, mock-orange, barbados-cherry, guava, bouganvillaea, gardenia, butterflybush.	Capejasmine, cedrus deodara, flowering cherry, dogwood, American elm, plum, peach, pecan.

See footnotes at end of table.

TABLE 13.--GARDENING AND LANDSCAPING

Soil series and map symbol	Flowers	Shrubs	Trees
Crockett: 19, 20, 21	Cornflower, aster, shasta daisy, agapanthus, hollyhock, caladium, zinnia, canna.	Bridalwreath, goldflower, hydrangea, barbados-cherry, camellia, gardenia,	American elm, magnolia, arborvitae, Japanese black pine, Arizona ash, pecan, plum, sycamore.
Desan: 22	Cornflower, caladium, hibiscus, agapanthus, gladiolus, aster, hyacinth, canna.	Butterflybush, mockorange, bouganvillaea, barbados-cherry, gardenia, goldflower, bridalwreath, azalea.	FLowering crabapple, capejasmine, cedrus deodara, halepensis, dogwood, pecan, peach, plum.
Eddy: 23	Cornflower, amaryllis, hibiscus, hollyhock, aster, petunia, zinnia, scilla.	Guava, barbados-cherry, oleander, bottlebrush, bridalwreath, goldflower.	(2).
Ferris: [1]24	Cornflower, hollyhock, marigold, shasta daisy, hibiscus, daylily, petunia, gladiolus.	Panasgrass, crapemyrtle, gold flower, ligustrum, privet, bridalwreath, guava, duranta.	Japanese black pine, halepensis, American elm, Arizona ash, arborvitae, plum, peach, pecan.
Gaddy: 25, [1]26	Cornflower, agapanthus, canna, caladium, chrysanthemum, gladiolus, dahlia, marigold.	Oleander, bottlebrush, hydrangea, bridalwreath, jasmine, duranta, goldflower.	Arborvitae, Japanese black pine, live oak, plum, halepensis, sycamore, peach, pecan.
Gowen: 27, 28	Marigold, hollyhock, hibiscus shasta daisy, cornflower, zinnia, verbena, phlox.	Bougainvillaea, bridalwreath, duranta, goldflower, guava, jasmine, barbados-cherry, bottlebrush.	Sycamore, arborvitae, American elm, Japanese black pine, magnolia, pecan, plum, peach.
Heiden: 29, 30, 31, [1]32	Marigold, hibiscus, gladiolus, daylily, petunia, verbena, zinnia, chrysanthemum.	Panasgrass, ligustrum, crapemyrtle, guava, goldflower, duranta, bridalwreath, bottlebrush.	Magnolia, sycamore, live oak, arborvitae, Arizona ash, peach, plum, pecan.
Highbank: 33	Cornflower, shasta daisy, hibiscus, hollyhock, zinnia, marigold, petunia, canna.	Bottlebrush, duranta, oleander, bougainvillaea, goldflower, bridalwreath, guava, quince.	Halepensis, Japanese black pine, live oak, sycamore, magnolia, peach, plum, pecan.
Houston Black: 34, 35	Canna, chrysanthemum, dahlia, gladiolus, iris, petunia, zinnia, marigold.	Bridalwreath, duranta, goldflower, guava, crapemyrtle, ligustrum, panasgrass, privet.	Arborvitae, American elm, sycamore, live oak, halepensis, plum, pecan, peach.
Lewisville: 36, 37	Marigold, cornflower, petunia, shasta daisy, zinnia, hibiscus, gladiolus, hollyhock.	Jasmine, guava, ligustrum, crapemyrtle, bridalwreath, goldflower, barbados-cherry, duranta.	Halepensis, arborvitae, sycamore, Japanese black pine, American elm, pecan, plum, peach.

See footnotes at end of table.

TABLE 13.--GARDENING AND LANDSCAPING

Soil series and map symbol	Flowers	Shrubs	Trees
Lott: 38, 39	Zinnia, marigold, hibiscus, cornflower, gladiolus, petunia, hollyhock, shasta daisy.	Barbadoa-cherry, bottlebrush, bridalwreath, duranta, goldflower, guava, crapemyrtle, ligustrum.	Magnolia, sycamore, live oak, American elm, halepensis, plum, peach, pecan.
Normangee: 40, 41, 42	Aster, agapanthus, caladium, canna, cornflower, shasta daisy, hollyhock, zinnia.	Bottlebrush, goldflower, guava, bridalwreath, jasmine, pyracantha, oleander, bougainvillaea.	Cedrus deodara, Arizona ash, magnolia, American elm, sycamore, halepensis, plum, peach, pecan.
Ovan: 43, 44	Gladiolus, zinnia, petunia, marigold, hollyhock, hibiscus, shasta daisy, cornflower.	Privet, panasgrass, ligustrum, crapemyrtle, guava, goldflower, duranta, bridalwreath.	Halepensis, Arizona ash, live oak, magnolia, Japanese black pine, pecan, plum, peach.
Padina: 145	Hyacinth, canna, aster, hibiscus, gladiolus, agapanthus, caladium, cornflower.	Azalea, butterflybush, guava, camellia, gardenia, quince, pyrancantha, jasmine.	Cedrus deodara, halepensis, flowering cherry, capejasmine, dogwood, pecan, plum, peach.
Roetex: 46	Gladiolus, geranium, iris, larkspur, daylily, phlox, verbena, zinnia.	Bottlebrush, guava, crapemyrtle, bridalwreath, ligustrum, duranta, panasgrass, goldflower.	Japanese black pine, halepensis, American elm, Arizona ash, arborvitae, plum, peach, pecan.
Satin: 47	Hollyhock, gladiolus, hibiscus, zinnia, shasta daisy, petunia, cornflower, marigold.	Guava, privet, goldflower, panasgrass, duranta, ligustrum, bridalwreath, crapemyrtle.	Arborvitae, Japanese black pine, live oak, halepensis, sycamore, plum, pecan, peach.
Ships: 48, 149	Geranium, larkspur, phlox, zinnia, marigold, hibiscus, gladiolus, verbena.	Crapemyrtle, goldflower, bridalwreath, duranta, barbados-cherry, ligustrum, bottlebrush.	Sycamore, arborvitae, American elm, Japanese black pine, magnolia, plum, peach, pecan.
Silawa: 50, 51, 52, 53	Hibiscus, cornflower, caladium, agapanthus, hyacinth, gladiolus, canna, aster.	Butterflybush, oleander, camellia, pyracantha, mock-orange, bottlebrush, jasmine, bridalwreath.	Flowering crabapple, dogwood, live oak, cedrus deodara, capejasmine, peach, plum, pecan.
Silstid: 54	Canna, hibiscus, agapanthus, cornflower, hyacinth, aster, gladiolus, caladium.	Quince, jasmine, azalea, pyracantha, guava, goldflower, mock-orange, camellia.	Dogwood, flowering cherry, cedrus deodara, capejasmine, Arizona ash, plum, peach, pecan.
Stephen: 55	Aster, cornflower, petunia, amaryllis, zinnia, hibiscus, scilla, hollyhock.	Guava, bridalwreath, barbados-cherry, oleander, goldflower, bottlebrush.	(2).

TABLE 13.--GARDENING AND LANDSCAPING

Soil series and map symbol	Flowers	Shrubs	Trees
Tabor: 56, 57	Hollyhock, cornflower, caladium, aster, zinnia, shasta daisy, canna, agapanthus.	Pyracantha, oleander, jasmine, goldflower, bridalwreath, bottlebrush, bougainvillaea, quince.	Arizona ash, magnolia, cedrus deodara, sycamore, halepensis.
Trinity: 58, 59	Cornflower, hibiscus, gladiolus, chrysanthemum, geranium, iris, larkspur, petunia.	Privet, panasgrass, ligustrum, crapemyrtle, bridalwreath, goldflower, guava, duranta.	Japanese black pine, halepensis, American elm, Arizona ash, arborvitae, plum, peach, pecan.
Weswood: 60, 61, [1]62	Shasta daisy, hollyhock, petunia, gladiolus, cornflower, hibiscus, marigold, zinnia.	Bottlebrush, duranta, bridalwreath, goldflower, guava, crapemyrtle, ligustrum, panasgrass.	Sycamore, Arizona ash, live oak, halepensis, magnolia, peach, plum, pecan.
Wilson: 63, 64, 65, 66, 67	Zinnia, hollyhock, shasta daisy, cornflower, canna, caladium, agapanthus, aster.	Quince, bottlebrush, bridalwreath, goldflower, oleander, pyracantha, jasmine.	Live oak, halepensis, Arizona ash, American elm, cedrus deodara, plum, peach, pecan.
Yahola: 68	Chrysanthemum, cornflower, canna, gladiolus, dahlia, caladium, marigold, agapanthus.	Barbados-cherry, hydrangea, bridalwreath, bottlebrush, goldflower, jasmine, oleander, duranta.	Magnolia, sycamore, live oak, arborvitae, Arizona ash, pecan, peach, plum.

[1]This map unit is made up of two or more dominant kinds of soils. See map unit description for the composition and behavior of the whole unit.
[2]No trees recommended.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Aledo:											
1----------	0-5	Fine sandy loam	CL, GC, SC	A-2-4, A-4, A-6, A-2-6	0-20	50-95	45-90	30-90	30-70	25-40	10-20
	5-10	Very gravelly fine sandy loam, very gravelly loam.	GC, GM, SC	A-2-4, A-2-6	5-30	35-55	30-50	25-50	15-35	30-40	10-20
	10-12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Altoga:											
2, [1]3, [1]4---------	0-25	Silty clay------	CL, CH	A-6, A-7-6	0	95-100	95-100	85-100	80-99	35-51	20-31
	25-80	Silty clay, silty clay loam, clay loam.	CL	A-6, A-7-6	0	95-100	95-100	85-100	65-99	30-48	15-30
Austin:											
5, 6----------	0-17	Silty clay------	CH, CL	A-7-6	0-5	95-100	90-100	80-100	75-95	45-65	25-40
	17-29	Silty clay, clay, silty clay loam.	CH, CL	A-7-6	0-5	95-100	90-100	80-100	75-95	45-65	22-38
	29-35	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Axtell:											
7, 8, 9----------	0-9	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2-4, A-4	0	90-100	80-100	75-95	28-60	<31	NP-7
	9-34	Clay, clay loam, sandy clay.	CL, CH	A-7-6	0-2	90-100	75-100	75-100	51-75	42-60	25-40
	34-80	Sandy clay loam, clay loam, clay.	CL, CH, SC	A-6, A-7-6	0-2	85-100	75-100	75-95	36-88	35-55	15-35
[1]10:											
Axtell part------	0-9	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2-4, A-4	0	90-100	80-100	75-95	28-60	<31	NP-7
	9-34	Clay, clay loam, sandy clay.	CL, CH	A-7-6	0-2	90-100	75-100	75-100	51-75	42-60	25-40
	34-80	Sandy clay loam, clay loam, clay.	CL, CH, SC	A-6, A-7-6	0-2	85-100	75-100	75-95	36-88	35-55	15-35
Crockett part----	0-9	Fine sandy loam	SM, ML, CL, SC	A-2, A-4, A-6	0-2	95-100	95-100	90-100	35-95	15-35	3-15
	9-53	Clay, clay loam, sandy clay.	CH, CL	A-7-6, A-6	0	85-100	80-100	75-100	65-91	36-60	22-40
	53-80	Clay loam, sandy clay loam, loam.	CL	A-6, A-7-6	0-5	90-100	85-100	75-100	51-90	30-45	11-30

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Bastrop:											
11	0-11	Fine sandy loam	ML, SM, CL-ML, SM-SC	A-4	0	95-100	80-100	80-100	36-70	18-25	2-7
	11-67	Sandy clay loam, clay loam, loam.	CL, SC	A-6	0	95-100	80-100	80-100	40-70	26-40	11-22
	67-80	Very gravelly sandy clay loam, very gravelly loamy fine sand.	GC, CL, SC	A-2-6, A-6	0-3	50-100	30-100	30-100	20-70	26-40	11-22
Blum Variant:											
12	0-15	Fine sandy loam	SM, SM-SC, CL-ML, ML	A-4	0	95-100	95-100	70-85	40-55	<26	NP-7
	15-20	Sandy clay loam	CL, SC	A-4, A-6	0	95-100	95-100	80-95	40-60	28-39	9-18
	20-38	Clay	CL, CH	A-7-6	0	95-100	95-100	90-100	75-95	44-57	25-35
	38-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Branyon:											
13, 14	0-80	Clay	CH	A-7-6	0	95-100	75-100	75-100	75-100	60-80	35-55
Bunyan:											
15	0-50	Fine sandy loam	SM-SC, SC, CL, CL-ML	A-4, A-6	0	100	95-100	70-95	40-75	20-35	3-16
	50-80	Stratified clay loam to fine sandy loam.	SC, CL, ML	A-4, A-6	0	100	95-100	80-100	40-95	20-40	8-25
Burleson:											
16, 17	0-37	Clay	CH, MH	A-7-6, A-7-5	0-2	83-100	80-100	80-100	80-95	51-80	27-55
	37-80	Clay, silty clay	CH, MH	A-7-6, A-7-5	0-1	95-100	80-100	75-95	70-95	51-80	30-55
Chazos:											
18	0-12	Loamy fine sand	SM, SM-SC, SP-SM	A-2-4, A-4, A-3	0	80-100	80-100	65-98	7-45	<25	NP-4
	12-34	Clay, sandy clay	CL, CH	A-7-6	0	90-100	90-100	90-100	51-85	42-60	24-42
	34-72	Clay, sandy clay loam, sandy clay.	CL, CH, SC, SM-SC	A-6, A-7-6, A-2	0	90-100	90-100	80-100	25-85	25-60	6-40
Crockett:											
19, 20, 21	0-9	Fine sandy loam	SM, ML, CL, SC	A-2, A-4, A-6	0-2	95-100	95-100	90-100	35-95	15-35	3-15
	9-53	Clay, clay loam, sandy clay.	CH, CL	A-7-6 A-6	0	85-100	80-100	75-100	65-91	36-60	22-40
	53-80	Clay loam, sandy clay loam, loam.	CL	A-6, A-7-6	0-5	90-100	85-100	75-100	51-90	30-45	11-30
Desan:											
22	0-54	Loamy fine sand	SM, SP-SM, SM-SC	A-2-4, A-3	0	98-100	95-100	85-100	8-28	<25	NP-5
	54-80	Sandy clay loam, fine sandy loam.	SC	A-2, A-4, A-6	0	98-100	95-100	90-100	25-50	20-36	8-20

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Eddy:											
23	0-5	Gravelly clay loam.	GC	A-2, A-6	0-20	40-50	35-50	30-45	20-40	30-40	11-20
	5-9	Gravelly clay loam, very gravelly loam, very gravelly clay loam.	GC, GP-GC	A-2	0-60	20-50	15-45	10-38	8-35	30-40	11-20
	9-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ferris:											
1 24:											
Ferris part	0-60	Clay	CH	A-7-6	0	95-100	95-100	75-100	75-98	51-70	35-50
Heiden part	0-21	Clay	CH	A-7-6	0	95-100	90-100	80-100	75-99	54-80	35-55
	21-80	Clay, silty clay	CH	A-7-6	0	90-100	90-100	75-100	70-99	52-80	35-55
Gaddy:											
25	0-8	Silt loam	SM, SC, ML, CL	A-4	0	100	98-100	94-100	36-80	<30	NP-10
	8-80	Loamy fine sand, fine sand.	SM	A-2	0	100	98-100	90-100	15-35	---	NP
1 26	0-7	Loamy fine sand	SM	A-2	0	100	98-100	90-100	15-35	---	NP
	7-80	Loamy fine sand, fine sand.	SM	A-2	0	100	98-100	90-100	15-35	---	NP
Gowen:											
27, 28	0-36	Clay loam	CL	A-6, A-7-6	0	100	95-100	85-100	60-85	28-43	11-25
	36-80	Clay loam, loam	CL	A-4, A-6, A-7-6	0	100	95-100	85-100	55-85	25-43	10-25
Heiden:											
29, 30, 31	0-21	Clay	CH	A-7-6	0	95-100	90-100	80-100	75-99	54-80	35-55
	21-80	Clay, silty clay	CH	A-7-6	0	90-100	90-100	75-100	70-99	52-80	35-55
1 32:											
Heiden part	0-21	Clay	CH	A-7-6	0	95-100	90-100	80-100	75-99	54-80	35-55
	21-80	Clay, silty clay	CH	A-7-6	0	90-100	90-100	75-100	70-99	52-80	35-55
Ferris part	0-60	Clay	CH	A-7-6	0	95-100	95-100	75-100	75-98	51-70	35-50
Highbank:											
33	0-14	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	75-98	30-50	15-30
	14-24	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	90-100	40-60	20-40
	24-48	Clay	CH	A-7-6	0	99-100	99-100	95-100	95-100	55-75	35-50
	48-62	Clay, silty clay, silty clay loam.	CH	A-7-6	0	98-100	98-100	95-100	85-100	51-70	32-50
Houston Black:											
34, 35	0-28	Clay	CH	A-7-6	0	95-100	95-100	95-100	85-100	58-90	34-65
	28-80	Clay, silty clay	CH	A-7-6	0	95-100	95-100	95-100	85-100	58-90	34-65
Lewisville:											
36, 37	0-15	Silty clay	CL, CH	A-7-6	0	100	99-100	82-99	80-95	41-59	20-36
	15-34	Silty clay, clay loam.	CL, CH	A-7-6	0	99-100	98-100	73-99	72-95	48-60	25-36
	34-65	Silty clay, clay loam.	CL, CH, SC	A-6, A-7	0	83-100	65-99	56-98	41-95	30-55	12-34

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lott:											
38, 39	0-15	Silty clay	CL, CH	A-7-6	0	95-100	95-100	85-100	75-95	41-55	22-35
	15-47	Silty clay, silty clay loam, clay.	CL, CH	A-7-6, A-6	0	95-100	95-100	85-100	75-95	35-52	20-35
	47-80	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Normangee:											
40, 41, 42	0-8	Clay loam	CL	A-6, A-7-6	0	98-100	96-100	90-100	55-85	30-48	11-25
	8-42	Clay	CL, CH	A-7-6	0	98-100	98-100	90-100	70-96	44-80	22-58
	42-60	Stratified shaly clay.	CL, CH	A-7-6	0	95-100	90-100	90-100	70-90	41-60	20-35
Ovan:											
43, 44	0-80	Silty clay	CL, CH	A-7-6	0	100	100	90-100	85-100	48-70	25-45
Padina:											
[1]45	0-49	Fine sand	SM, SP-SM, SM-SC	A-2-4, A-3	0	100	95-100	85-100	8-28	<25	NP-5
	49-80	Sandy clay loam, fine sandy loam.	SC	A-2, A-4, A-6	0	90-100	90-100	90-100	25-50	22-36	8-20
Roetex:											
46	0-12	Clay	CH, CL	A-7-6	0	100	100	95-100	90-100	41-70	20-50
	12-54	Clay, silty clay	CH	A-7-6	0	100	98-100	95-100	90-100	48-66	25-40
	54-62	Clay, silty clay, clay loam.	CH, CL	A-6, A-7-6	0	100	98-100	95-100	75-100	35-66	15-40
Satin:											
47	0-5	Clay loam	CH, SC	A-7-6	0-3	70-95	65-95	55-90	45-75	55-70	30-45
	5-34	Very gravelly clay, gravelly clay.	SC, GC	A-2-7, A-7-6	0-5	20-75	15-50	13-50	10-45	75-98	45-68
	34-80	Clay	CL, CH	A-6, A-7-6	0	90-100	85-100	75-100	60-100	35-55	20-40
Ships:											
48, [1]49	0-54	Clay	CH	A-7-6	0	100	100	95-100	95-100	60-75	35-50
	54-80	Clay, silty clay, silty clay loam.	CH	A-7-6	0	100	100	95-100	85-100	51-70	32-50
Silawa:											
50	0-16	Loamy fine sand	SM, SM-SC	A-2-4	0	80-100	80-100	70-100	15-35	<25	NP-4
	16-53	Sandy clay loam, fine sandy loam.	CL, SC	A-4, A-6	0	80-100	80-100	80-100	35-60	25-40	8-18
	53-70	Fine sandy loam, gravelly fine sandy loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-2-4, A-2-6	0-2	45-100	45-100	38-100	18-60	21-34	4-14
	70-80	Loamy fine sand, gravelly loamy sand, fine sandy loam.	SM, SM-SC	A-2-4, A-4	0-2	45-100	45-100	38-100	12-40	<26	NP-7

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Silawa:											
51, 52, 53	0-13	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	80-100	80-100	70-100	40-60	<26	NP-7
	13-38	Sandy clay loam, fine sandy loam.	CL, SC	A-4, A-6	0	80-100	80-100	80-100	35-60	25-40	8-18
	38-59	Fine sandy loam, gravelly fine sandy loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-2-4, A-2-6	0-2	45-100	45-100	38-100	18-60	21-34	4-14
	59-70	Loamy fine sand, gravelly loamy sand, fine sandy loam.	SM, SM-SC	A-2-4, A-4	0-2	45-100	45-100	38-100	12-40	<26	NP-7
Silstid:											
54	0-26	Loamy fine sand	SM, SP-SM	A-2-4	0	95-100	95-100	90-100	10-25	<25	NP-3
	26-56	Sandy clay loam, loam, fine sandy loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2-4, A-2-6	0	95-100	95-100	80-100	30-55	20-40	4-22
	56-80	Sandy clay loam, loam, fine sandy loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2-4, A-2-6	0	95-100	85-100	70-100	22-55	20-40	4-22
Stephen:											
55	0-15	Silty clay	CL, CH	A-7-6	0-5	95-100	90-100	85-100	80-90	45-66	22-42
	15-19	Variable	---	---	---	---	---	---	---	---	---
	19-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tabor:											
56, 57	0-12	Fine sandy loam	ML, SM, CL-ML, SC-SM	A-4, A-2-4	0	85-100	75-100	70-100	30-55	<25	NP-7
	12-44	Clay	CH, CL	A-7-6	0	95-100	90-100	85-100	55-90	45-65	25-40
	44-70	Clay, clay loam, sandy clay loam.	CH, CL, SC	A-7-6 A-6	0	95-100	90-100	75-100	40-90	35-60	15-35
Trinity:											
58, 59	0-80	Clay	CH	A-7-6	0	100	98-100	85-100	80-99	55-90	30-60
Weswood:											
60	0-6	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	70-95	20-35	4-15
	6-60	Silt loam, silty clay loam.	CL	A-6, A-7-6	0	100	100	90-100	70-98	30-46	11-26
61, 162	0-6	Silty clay loam	CL	A-6, A-7-6	0	100	100	90-100	75-98	30-50	11-30
	6-60	Silt loam, silty clay loam.	CL	A-6, A-7-6	0	100	100	90-100	70-98	30-46	11-26
Wilson:											
63, 64	0-6	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	80-100	60-96	24-36	7-18
	6-39	Silty clay, clay, clay loam.	CL, CH	A-7-6, A-6	0	90-100	80-100	80-100	65-96	40-55	21-35
	39-80	Silty clay, clay	CL, CH	A-7-6, A-6	0	95-100	90-100	85-100	70-90	40-57	24-35
65, 66, 67	0-6	Silty clay loam	CL	A-4, A-6	0	95-100	85-100	80-100	60-96	25-36	8-20
	6-39	Silty clay, clay, clay loam.	CL, CH	A-7-6, A-6	0	90-100	80-100	80-100	65-96	40-55	21-35
	39-80	Silty clay, clay	CL, CH	A-7-6, A-6	0	95-100	90-100	85-100	70-90	40-57	24-35

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Yahola:											
68----------	0-10	Fine sandy loam	SM, SC, ML, CL	A-4	0	100	95-100	90-100	36-85	<30	NP-10
	10-37	Fine sandy loam, loam.	SM, SC, ML, CL	A-4	0	100	95-100	90-100	36-85	<30	NP-10
	37-80	Fine sandy loam, loam, loamy fine sand.	SM, SC, ML, CL	A-4, A-2	0	100	95-100	90-100	15-85	<30	NP-10

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Aledo:									
1	0-5	0.6-2.0	0.07-0.18	7.9-8.4	Low	Moderate	Low	0.32	1
	5-10	0.6-2.0	0.05-0.12	7.9-8.4	Low	Moderate	Low	0.32	
	10-12	---	---	---	---	---	---	---	
Altoga:									
2, 13, 14	0-25	0.6-2.0	0.15-0.18	7.9-8.4	High	High	Low	0.32	5
	25-80	0.6-2.0	0.15-0.18	7.9-8.4	Moderate	High	Low	0.32	
Austin:									
5, 6	0-17	0.2-0.6	0.15-0.20	7.9-8.4	High	High	Low	0.32	2
	17-29	0.2-0.6	0.15-0.20	7.9-8.4	Moderate	High	Low	0.32	
	29-35	---	---	---	---	---	---	---	
Axtell:									
7, 8, 9	0-9	0.6-2.0	0.11-0.15	5.1-6.5	Low	Moderate	Moderate	0.43	5
	9-34	<0.06	0.13-0.18	4.5-7.3	High	High	Moderate	0.37	
	34-80	0.2-0.6	0.13-0.18	5.6-8.4	High	High	Low	0.37	
110:									
Axtell part	0-9	0.6-2.0	0.11-0.15	5.1-6.5	Low	Moderate	Moderate	0.43	5
	9-34	<0.06	0.13-0.18	4.5-7.3	High	High	Moderate	0.37	
	34-80	0.2-0.6	0.13-0.18	5.6-8.4	High	High	Low	0.37	
Crockett part	0-9	0.6-2.0	0.11-0.20	5.6-7.3	Low	Moderate	Low	0.43	5
	9-53	<0.06	0.14-0.18	5.6-7.8	High	High	Low	0.32	
	53-80	0.06-0.2	0.15-0.20	7.4-8.4	Moderate	High	Low	0.32	
Bastrop:									
11	0-11	2.0-6.0	0.11-0.17	5.6-7.3	Low	Low	Low	0.24	5
	11-67	0.6-2.0	0.15-0.19	6.1-8.4	Low	Moderate	Low	0.32	
	67-80	0.6-2.0	0.15-0.19	6.1-8.4	Low	Moderate	Low	0.32	
Blum Variant:									
12	0-15	2.0-6.0	0.13-0.17	6.1-7.3	Low	Low	Low	0.32	2
	15-20	0.6-2.0	0.14-0.18	6.1-7.8	Moderate	Moderate	Low	0.37	
	20-38	0.06-0.2	0.12-0.18	6.1-7.8	High	High	Low	0.32	
	38-40	---	---	---	---	---	---	---	
Branyon:									
13, 14	0-80	<0.06	0.15-0.18	7.9-8.4	Very high	High	Low	0.32	5
Bunyan:									
15	0-50	2.0-6.0	0.11-0.15	6.1-7.3	Low	Low	Low	0.43	5
	50-80	0.6-2.0	0.11-0.15	5.6-8.4	Low	Moderate	Low	0.43	
Burleson:									
16, 17	0-37	<0.06	0.12-0.18	5.6-8.4	High	High	Low	0.32	4
	37-80	<0.06	0.12-0.18	7.4-8.4	High	High	Low	0.32	
Chazos:									
18	0-12	2.0-6.0	0.05-0.10	5.6-7.3	Very low	Low	Low	0.20	5
	12-34	0.06-0.2	0.15-0.18	5.6-6.5	Moderate	High	Moderate	0.32	
	34-72	0.06-0.2	0.15-0.18	7.9-8.4	Moderate	High	Low	0.28	
Crockett:									
19, 20, 21	0-9	0.6-2.0	0.11-0.20	5.6-7.3	Low	Moderate	Low	0.43	5
	9-53	<0.06	0.14-0.18	5.6-7.8	High	High	Low	0.32	
	53-80	0.06-0.2	0.15-0.20	7.4-8.4	Moderate	High	Low	0.32	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Desan:									
22	0-54	6.0-20	0.05-0.08	5.1-7.3	Very low	Low	Low	0.17	5
	54-80	0.6-2.0	0.14-0.18	5.1-6.5	Low	Moderate	Moderate	0.24	
Eddy:									
23	0-5	0.2-0.6	0.10-0.13	7.9-8.4	Low	High	Low	0.24	1
	5-9	0.2-0.6	0.03-0.07	7.9-8.4	Low	High	Low	0.24	
	9-60	---	---	---	---	---	---	---	
Ferris:									
[1]24:									
Ferris part	0-60	<0.06	0.15-0.18	7.9-8.4	Very high	High	Low	0.32	4
Heiden part	0-21	<0.06	0.15-0.20	7.9-8.4	Very high	High	Low	0.32	5
	21-80	<0.06	0.12-0.20	7.9-8.4	Very high	High	Low	0.32	
Gaddy:									
25	0-8	2.0-6.0	0.11-0.15	7.4-8.4	Low	Low	Low	0.43	5
	8-80	6.0-20	0.06-0.10	7.9-8.4	Low	Low	Low	0.17	
[1]26	0-7	6.0-20	0.07-0.11	7.4-8.4	Low	Low	Low	0.17	5
	7-80	6.0-20	0.06-0.10	7.9-8.4	Low	Low	Low	0.17	
Gowen:									
27, 28	0-36	0.6-2.0	0.15-0.20	6.6-8.4	Moderate	Moderate	Low	0.28	5
	36-80	0.6-2.0	0.15-0.20	6.6-8.4	Moderate	Moderate	Low	0.28	
Heiden:									
29, 30, 31	0-21	<0.06	0.15-0.20	7.9-8.4	Very high	High	Low	0.32	5
	21-80	<0.06	0.12-0.20	7.9-8.4	Very high	High	Low	0.32	
[1]32:									
Heiden part	0-21	<0.06	0.15-0.20	7.9-8.4	Very high	High	Low	0.32	5
	21-80	<0.06	0.12-0.20	7.9-8.4	Very high	High	Low	0.32	
Ferris part	0-60	<0.06	0.15-0.18	7.9-8.4	Very high	High	Low	0.32	4
Highbank:									
33	0-14	0.6-2.0	0.17-0.22	7.9-8.4	Low	High	Low	0.32	5
	14-24	0.2-0.6	0.14-0.20	7.9-8.4	Moderate	High	Low	0.32	
	24-48	0.06-0.2	0.14-0.19	7.9-8.4	Very high	High	Low	0.32	
	48-62	0.06-0.2	0.14-0.20	7.9-8.4	Very high	High	Low	0.32	
Houston Black:									
34, 35	0-28	<0.06	0.15-0.20	7.4-8.4	Very high	High	Low	0.32	4
	28-80	<0.06	0.15-0.20	7.4-8.4	Very high	High	Low	0.32	
Lewisville:									
36, 37	0-15	0.6-2.0	0.16-0.20	7.9-8.4	High	High	Low	0.32	5
	15-34	0.6-2.0	0.14-0.18	7.9-8.4	High	High	Low	0.37	
	34-65	0.6-2.0	0.14-0.18	7.9-8.4	High	High	Low	---	
Lott:									
38, 39	0-15	0.2-0.6	0.15-0.20	7.9-8.4	High	High	Low	0.32	4
	15-47	0.2-0.6	0.15-0.20	7.9-8.4	Moderate	High	Low	0.32	
	47-80	---	---	---	---	---	---	---	
Normangee:									
40, 41, 42	0-8	0.06-0.2	0.15-0.20	5.6-7.3	Moderate	High	Low	0.43	3
	8-42	<0.06	0.12-0.18	5.6-8.4	High	High	Low	0.37	
	42-60	<0.06	0.12-0.18	6.1-8.4	High	High	Low	---	
Ovan:									
43, 44	0-80	<0.06	0.15-0.20	7.9-8.4	High	High	Low	0.32	5

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Padina:									
145	0-49	6.0-20	0.05-0.08	5.6-7.3	Very low	Low	Low	0.17	5
	49-80	0.2-0.6	0.14-0.18	5.1-6.5	Low	High	Moderate	0.24	
Roetex:									
46	0-12	<0.06	0.14-0.19	7.4-8.4	Very high	High	Low	0.32	5
	12-54	<0.06	0.14-0.19	7.9-8.4	Very high	High	Low	0.32	
	54-62	<0.06	0.14-0.19	7.9-8.4	Very high	High	Low	0.32	
Satin:									
47	0-5	0.06-0.2	0.12-0.18	6.6-7.8	High	High	Low	0.37	5
	5-34	0.06-0.2	0.05-0.12	6.6-8.4	High	High	Low	0.28	
	34-80	0.06-0.2	0.12-0.18	7.9-8.4	High	High	Low	0.32	
Ships:									
48, 149	0-54	<0.06	0.14-0.19	7.9-8.4	Very high	High	Low	0.32	5
	54-80	<0.06	0.14-0.19	7.9-8.4	Very high	High	Low	0.32	
Silawa:									
50	0-16	6.0-20	0.07-0.11	5.6-6.5	Very low	Low	Moderate	0.17	5
	16-53	0.6-2.0	0.12-0.17	5.1-6.0	Low	Moderate	Moderate	0.32	
	53-70	2.0-6.0	0.08-0.15	5.1-6.5	Low	Low	Moderate	0.32	
	70-80	6.0-20	0.05-0.11	5.1-6.5	Very low	Low	Moderate	0.20	
51, 52, 53	0-13	2.0-6.0	0.10-0.15	5.6-6.5	Low	Low	Moderate	0.24	5
	13-38	0.6-2.0	0.12-0.17	5.1-6.0	Low	Moderate	Moderate	0.32	
	38-59	2.0-6.0	0.08-0.15	5.1-6.5	Low	Low	Moderate	0.32	
	59-70	6.0-20	0.05-0.11	5.1-6.5	Very low	Low	Moderate	0.20	
Silstid:									
54	0-26	6.0-20	0.05-0.10	5.6-6.5	Low	Low	Moderate	0.17	5
	26-56	0.6-2.0	0.12-0.17	5.6-6.5	Low	Moderate	Moderate	0.24	
	56-80	0.6-2.0	0.10-0.16	5.6-6.5	Low	Moderate	Moderate	0.24	
Stephen:									
55	0-15	0.2-0.6	0.10-0.15	7.9-8.4	Moderate	High	Low	0.32	1
	15-19	---	---	---	---	---	---	---	
	19-28	---	---	---	---	---	---	---	
Tabor:									
56, 57	0-12	0.6-2.0	0.11-0.15	5.1-6.5	Low	Low	Moderate	0.37	5
	12-44	<0.06	0.14-0.18	4.5-5.5	High	High	High	0.32	
	44-70	<0.06	0.14-0.18	5.6-7.8	High	High	Moderate	0.32	
Trinity:									
58, 59	0-80	<0.06	0.15-0.20	7.4-8.4	Very high	High	Low	0.32	5
Weswood:									
60	0-6	0.6-2.0	0.15-0.20	7.9-8.4	Low	High	Low	0.43	5
	6-60	0.6-2.0	0.15-0.22	7.9-8.4	Low	High	Low	0.43	
61, 162	0-6	0.6-2.0	0.15-0.22	7.9-8.4	Low	High	Low	0.43	5
	6-60	0.6-2.0	0.15-0.22	7.9-8.4	Low	High	Low	0.43	
Wilson:									
63, 64	0-6	0.2-0.6	0.15-0.20	5.6-7.8	Low	High	Low	0.43	5
	6-39	<0.06	0.14-0.20	5.6-7.8	High	High	Low	0.37	
	39-80	<0.06	0.12-0.15	6.6-8.4	High	High	Low	0.37	
65, 66, 67	0-6	0.2-0.6	0.15-0.20	5.6-7.8	Low	High	Low	0.43	5
	6-39	<0.06	0.14-0.20	5.6-7.8	High	High	Low	0.37	
	39-80	<0.06	0.12-0.15	6.6-8.4	High	High	Low	0.37	
Yahola:									
68	0-10	2.0-6.0	0.12-0.16	7.4-8.4	Low	Low	Low	0.28	5
	10-37	2.0-6.0	0.12-0.16	7.9-8.4	Low	Low	Low	0.28	
	37-80	2.0-6.0	0.07-0.16	7.9-8.4	Low	Low	Low	0.28	

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The definitions of "flooding" and "water table" in the Glossary explain the terms "rare," "brief," and "perched." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Aledo: 1	C	None	---	---	>6.0	---	---	8-12	Hard
Altoga: 2, [1]3, [1]4	C	None	---	---	>6.0	---	---	>60	---
Austin: 5, 6	C	None	---	---	>6.0	---	---	20-40	Rippable
Axtell: 7, 8, 9	D	None	---	---	>6.0	---	---	>60	---
[1]10:									
Axtell part	D	None	---	---	>6.0	---	---	>60	---
Crockett part	D	None	---	---	>6.0	---	---	>60	---
Bastrop: 11	B	None	---	---	>6.0	---	---	>60	---
Blum Variant: 12	C	None	---	---	2.5-3.5	Perched	May-Sep	34-39	Hard
Branyon: 13, 14	D	None	---	---	>6.0	---	---	>60	---
Bunyan: 15	B	Frequent	Brief	Oct-May	>6.0	---	---	>60	---
Burleson: 16, 17	D	None	---	---	>6.0	---	---	>60	---
Chazos: 18	C	None	---	---	>6.0	---	---	>60	---
Crockett: 19, 20, 21	D	None	---	---	>6.0	---	---	>60	---
Desan: 22	A	None	---	---	>6.0	---	---	>60	---
Eddy: 23	C	None	---	---	>6.0	---	---	3-9	Rippable
Ferris: [1]24:									
Ferris part	D	None	---	---	>6.0	---	---	>60	---
Heiden part	D	None	---	---	>6.0	---	---	>60	---
Gaddy: 25, [1]26	A	Common	Very brief	Sep-Mar	>6.0	---	---	>60	---
Gowen: 27, 28	B	Common	Brief	Sep-May	>6.0	---	---	>60	---
Heiden: 29, 30, 31	D	None	---	---	>6.0	---	---	>60	---
[1]32:									
Heiden part	D	None	---	---	>6.0	---	---	>60	---

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Heiden: [1]32: Ferris part	D	None	---	---	>6.0	---	---	>60	---
Highbank: 33	C	Common	Very brief	Oct-Mar	>6.0	---	---	>60	---
Houston Black: 34, 35	D	None	---	---	>6.0	---	---	>60	---
Lewisville: 36, 37	B	None	---	---	>6.0	---	---	>60	---
Lott: 38, 39	C	None	---	---	>6.0	---	---	40-60	Rippable
Normangee: 40, 41, 42	D	None	---	---	>6.0	---	---	>60	---
Ovan: 43, 44	D	Common	Brief	Mar-Jun	>6.0	---	---	>60	---
Padina: [1]45	B	None	---	---	3.0-6.0	Perched	Oct-May	>60	---
Roetex: 46	D	Common	Long	Oct-May	1.0-3.0	Apparent	Oct-May	>60	---
Satin: 47	C	None	---	---	>6.0	---	---	>60	---
Ships: 48, [1]49	D	Rare to common.	Brief	Oct-May	>6.0	---	---	>60	---
Silawa: 50, 51, 52, 53	B	None	---	---	>6.0	---	---	>60	---
Silstid: 54	A	None	---	---	>6.0	---	---	>60	---
Stephen: 55	C	None	---	---	>6.0	---	---	11-19	Rippable
Tabor: 56, 57	D	None	---	---	>6.0	---	---	>60	---
Trinity: 58, 59	D	Common	Brief	Feb-May	0-3.0	Apparent	Nov-Feb	>60	---
Weswood: 60, 61, [1]62	B	Rare to common.	Brief	Sep-Mar	>6.0	---	---	>60	---
Wilson: 63, 64, 65, 66, 67	D	None	---	---	0-1.0	Perched	Nov-Mar	>60	---
Yahola: 68	B	Common	Very brief	Sep-Mar	>6.0	---	---	>60	---

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole unit.

TABLE 17.--ENGINEERING AND TEST DATA

[Tests made by Texas Highway Department]

Soil name	Report No. 72-	Depth	Shrinkage			Mechanical analysis[1]													Liquid limit	Plasticity index
						Percentage passing sieve--										Percentage smaller than--				
			Limit	Lineal	Ratio	1 3/4 in	1 1/4 in	7/8 in	5/8 in	3/8 in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 60 (0.25 mm)	No. 200 (0.074 mm)	0.05 mm	0.005 mm	0.002 mm		
		In																	Pct	
Chazos loam, fine sand, 1 to 5 percent slopes.	152-R	0-16	17	2.2	1.76	100	100	100	100	100	100	100	91	71	27	19	2	1	20	4
	153-R	6-12	15	1.3	1.83	100	100	100	100	100	100	99	96	74	28	20	2	0	17	3
	154-R	12-22	11	15.9	1.98	100	100	100	100	100	100	99	96	86	65	61	42	41	46	29
	155-R	22-34	13	15.4	1.97	100	100	100	100	100	100	100	97	88	67	61	45	43	46	29
	156-R	34-41	13	15.2	1.99	100	100	100	100	100	100	100	97	88	66	60	39	37	46	31
	157-R	41-72	11	17.3	2.06	100	100	100	100	100	100	100	97	89	68	63	39	36	48	35
	131-R	0-7	15	0.6	1.87	100	100	100	100	100	100	99	92	77	45	34	6	3	16	2
	132-R	12-22	11	17.4	2.01	100	100	100	100	100	100	99	95	88	72	67	47	44	50	31
	133-R	41-61	13	13.6	1.99	100	100	100	100	100	100	99	93	84	63	56	33	28	40	27
Lott silty clay, 1 to 3 percent slopes.	121-R	5-15	10	17.9	2.02	100	100	100	99	99	99	99	97	95	84	73	40	27	50	31
	122-R	15-30	14	14.9	1.95	100	100	100	100	99	98	96	95	94	87	84	58	43	46	29
	123-R	30-47	14	12.6	1.90	100	100	100	100	100	99	98	97	96	91	88	63	40	40	23
	124-R	47-80	13	11.8	1.94	100	100	100	100	100	100	100	99	99	96	93	75	49	37	22
Ovan silty clay, frequently flooded.	144-R	0-29	14	18.0	1.95	100	100	100	100	100	100	100	100	100	99	94	58	40	55	36
	145-R	29-46	13	17.5	1.97	100	100	100	100	100	100	100	100	100	98	91	53	27	52	34
	146-R	46-80	12	16.5	1.98	100	100	100	100	100	100	100	99	98	90	84	54	39	49	32
Satin clay loam, 1 to 5 percent slopes.	139-R	0-5	14	19.8	1.90	100	100	100	97	95	89	82	71	65	55	47	24	16	64	38
	140-R	5-11	10	24.7	2.00	100	97	94	89	80	57	33	22	21	17	14	8	5	77	46
	141-R	11-18	10	26.6	1.98	100	100	96	94	87	63	30	19	19	15	14	8	5	87	51
	142-R	18-34	12	28.2	2.01	100	87	85	79	71	54	34	24	23	20	18	13	10	97	67
	143-R	34-80	11	16.8	2.06	100	100	100	100	100	100	99	99	99	97	95	75	51	45	30
Ships clay:	137-R	6-34	13	22.4	1.98	100	100	100	100	100	100	100	100	100	99	97	85	66	70	47
	138-R	34-54	13	22.0	1.97	100	100	100	100	100	100	100	100	100	100	100	87	69	69	45

[1]Mechanical analyses according to the AASHTO Designation T 88 (1). Results by this procedure frequentl
from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SC
procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are c
of all the material, including that coarser than 2 mm in diameter. In the SCS soil survey procedure, the fi
by the pipette method and the material coarser than 2 mm in diameter is excluded from calculations of grain-
mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[2]Unified and AASHTO Classification made by Soil Conservation Service personnel.

[3]Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed.
Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHTO Designation M

[4]Based on the Unified Soil Classfication System, Technical Memorandum No. 3-357, Volume 1, Waterways Ex
of Engineers, March 1953. (2)

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See "Soil Series and Morphology" for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Aledo	Loamy-skeletal, carbonatic, thermic Lithic Haplustolls
Altoga	Fine-silty, carbonatic, thermic Typic Ustochrepts
Austin	Fine-silty, carbonatic, thermic Entic Haplustolls
Axtell	Fine, montmorillonitic, thermic Udertic Paleustalfs
Bastrop	Fine-loamy, mixed, thermic Udic Paleustalfs
Blum Variant	Fine, mixed, thermic Aquic Argiustolls
Branyon	Fine, montmorillonitic, thermic Udic Pellusterts
*Bunyan	Fine-loamy, mixed, nonacid, thermic Typic Ustifluvents
Burleson	Fine, montmorillonitic, thermic Udic Pellusterts
Chazos	Fine, mixed, thermic Aquic Paleustalfs
Crockett	Fine, montmorillonitic, thermic Udertic Paleustalfs
Desan	Loamy, siliceous, thermic Grossarenic Paleustalfs
Eddy	Loamy-skeletal, carbonatic, thermic, shallow Typic Ustorthents
Ferris	Fine, montmorillonitic, thermic Udorthentic Chromusterts
Gaddy	Sandy, mixed, thermic Typic Ustifluvents
Gowen	Fine-loamy, mixed, thermic Cumulic Haplustolls
Heiden	Fine, montmorillonitic, thermic Udic Chromusterts
Highbank	Fine, mixed, thermic Fluventic Ustochrepts
Houston Black	Fine, montmorillonitic, thermic Udic Pellusterts
Lewisville	Fine-silty, mixed, thermic Typic Calciustolls
Lott	Fine-silty, carbonatic, thermic Entic Haplustolls
Normangee	Fine, montmorillonitic, thermic Vertic Haplustalfs
Ovan	Fine, montmorillonitic, thermic Udic Chromusterts
Padina	Loamy, siliceous, thermic Grossarenic Paleustalfs
Roetex	Fine, mixed, thermic Udertic Haplustolls
Satin	Clayey-skeletal, montmorillonitic, thermic Udic Argiustolls
Ships	Very-fine, mixed, thermic Udertic Haplustolls
Silawa	Fine-loamy, siliceous, thermic Ultic Haplustalfs
Silstid	Loamy, siliceous, thermic Arenic Paleustalfs
Stephen	Clayey, mixed, thermic, shallow Entic Haplustolls
Tabor	Fine, montmorillonitic, thermic Udertic Paleustalfs
Trinity	Very-fine, montmorillonitic, thermic Typic Pelluderts
Weswood	Fine-silty, mixed, thermic Fluventic Ustochrepts
Wilson	Fine, montmorillonitic, thermic Vertic Ochraqualfs
Yahola	Coarse-loamy, mixed (calcareous), thermic Typic Ustifluvents

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SOIL LEGEND

Soil names followed by the superscript 1/ are broadly defined units. The composition of these units is more variable than that of the others in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

SYMBOL	NAME
1	Aledo soils, 1 to 5 percent slopes 1/
2	Altoga silty clay, 1 to 3 percent slopes
3	Altoga soils, 3 to 5 percent slopes, eroded 1/
4	Altoga soils, 5 to 12 percent slopes, eroded 1/
5	Austin silty clay, 1 to 3 percent slopes
6	Austin silty clay, 3 to 5 percent slopes, eroded
7	Axtell fine sandy loam, 0 to 1 percent slopes
8	Axtell fine sandy loam, 1 to 3 percent slopes
9	Axtell fine sandy loam, 2 to 5 percent slopes, eroded
10	Axtell and Crockett soils, 2 to 8 percent slopes, severely eroded 1/
11	Bastrop fine sandy loam
12	Blum Variant fine sandy loam, 1 to 3 percent slopes 1/
13	Branyon clay, 0 to 1 percent slopes
14	Branyon clay, 1 to 3 percent slopes
15	Bunyan fine sandy loam, frequently flooded
16	Burleson clay, 0 to 1 percent slopes
17	Burleson clay, 1 to 3 percent slopes
18	Chazos loamy fine sand, 1 to 5 percent slopes
19	Crockett fine sandy loam, 0 to 1 percent slopes
20	Crockett fine sandy loam, 1 to 3 percent slopes
21	Crockett fine sandy loam, 2 to 5 percent slopes, eroded
22	Desan loamy fine sand, 0 to 5 percent slopes
23	Eddy gravelly clay loam, 1 to 5 percent slopes
24	Ferris-Heiden complex, 5 to 12 percent slopes, severely eroded
25	Gaddy silt loam, occasionally flooded
26	Gaddy soils, frequently flooded 1/
27	Gowen clay loam, occasionally flooded
28	Gowen clay loam, frequently flooded
29	Heiden clay, 1 to 3 percent slopes
30	Heiden clay, 3 to 5 percent slopes
31	Heiden clay, 2 to 5 percent slopes, eroded
32	Heiden-Ferris complex, 5 to 8 percent slopes, eroded
33	Highbank silty clay loam
34	Houston Black clay, 0 to 1 percent slopes
35	Houston Black clay, 1 to 3 percent slopes
36	Lewisville silty clay, 1 to 3 percent slopes
37	Lewisville silty clay, 3 to 5 percent slopes
38	Lott silty clay, 1 to 3 percent slopes
39	Lott silty clay, 3 to 5 percent slopes
40	Normangee clay loam, 0 to 1 percent slopes
41	Normangee clay loam, 1 to 3 percent slopes
42	Normangee clay loam, 2 to 5 percent slopes, eroded
43	Ovan silty clay, occasionally flooded
44	Ovan silty clay, frequently flooded
45	Padina fine sand, 0 to 5 percent slopes
46	Roetex clay, frequently flooded
47	Satin clay loam, 1 to 5 percent slopes
48	Ships clay
49	Ships clay, frequently flooded
50	Silawa loamy fine sand, 0 to 3 percent slopes
51	Silawa fine sandy loam, 1 to 3 percent slopes
52	Silawa fine sandy loam, 3 to 5 percent slopes
53	Silawa fine sandy loam, 3 to 8 percent slopes, eroded
54	Silstid loamy fine sand, 0 to 3 percent slopes
56	Stephen silty clay, 1 to 4 percent slopes
56	Tabor fine sandy loam, 0 to 1 percent slopes
57	Tabor fine sandy loam, 1 to 3 percent slopes
58	Trinity clay, occasionally flooded
59	Trinity clay, frequently flooded
60	Weswood silt loam, 0 to 1 percent slopes
61	Weswood silt clay loam, 0 to 1 percent slopes
62	Weswood complex, 0 to 8 percent slopes
63	Wilson loam, 0 to 1 percent slopes
64	Wilson loam, 1 to 3 percent slopes
65	Wilson silty clay loam, 0 to 1 percent slopes
66	Wilson silty clay loam, 1 to 3 percent slopes
67	Wilson silty clay loam, 2 to 5 percent slopes, eroded
68	Yahola fine sandy loam, occasionally flooded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (70)
- Federal (410)
- State (92)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA; FoB2)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

FALLS COUNTY, TEXAS — SHEET NUMBER 1

3 080 000 FEET

680 000 FEET

3 100 000 FEET

(Joins sheet 4)

(Joins sheet 2)

COUNTY

McLENNAN

Little Brushy Creek

Brushy Creek

Big Creek

2603

N

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS

This map was compiled on 1971 aerial photography by the following agencies
Cooperative soil survey, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximate positions

FALLS COUNTY, TEXAS — SHEET NUMBER 10

10

N

1 Mile 5000 Feet

0 ¼ ½ ¾ 1

Scale 1:20000

0 1000 2000 3000 4000 5000

3 000 000 FEET

627 000 FEET

631 000 FEET

2 995 000 FEET

(Joins sheet 16)

(Joins lower left)

McLENNAN COUNTY

Golinda

Long Branch

(Joins inset)

3 005 000 FEET

(Joins sheet 17)

(Joins inset, sheet 6)

3 025 000 FEET

640 000 FEET

(Joins sheet 11)

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners if shown, are approximately positioned

FALLS COUNTY, TEXAS NO. 10

FALLS COUNTY, TEXAS — SHEET NUMBER 11

3 030 000 FEET

(Joins sheet 6)

(Joins sheet 10)

(Joins sheet 12)

3 050 000 FEET

(Joins sheet 18)

11

N

1 Mile

5000 Feet

Scale 1:20000

Bull Hide Creek

Sandy Creek

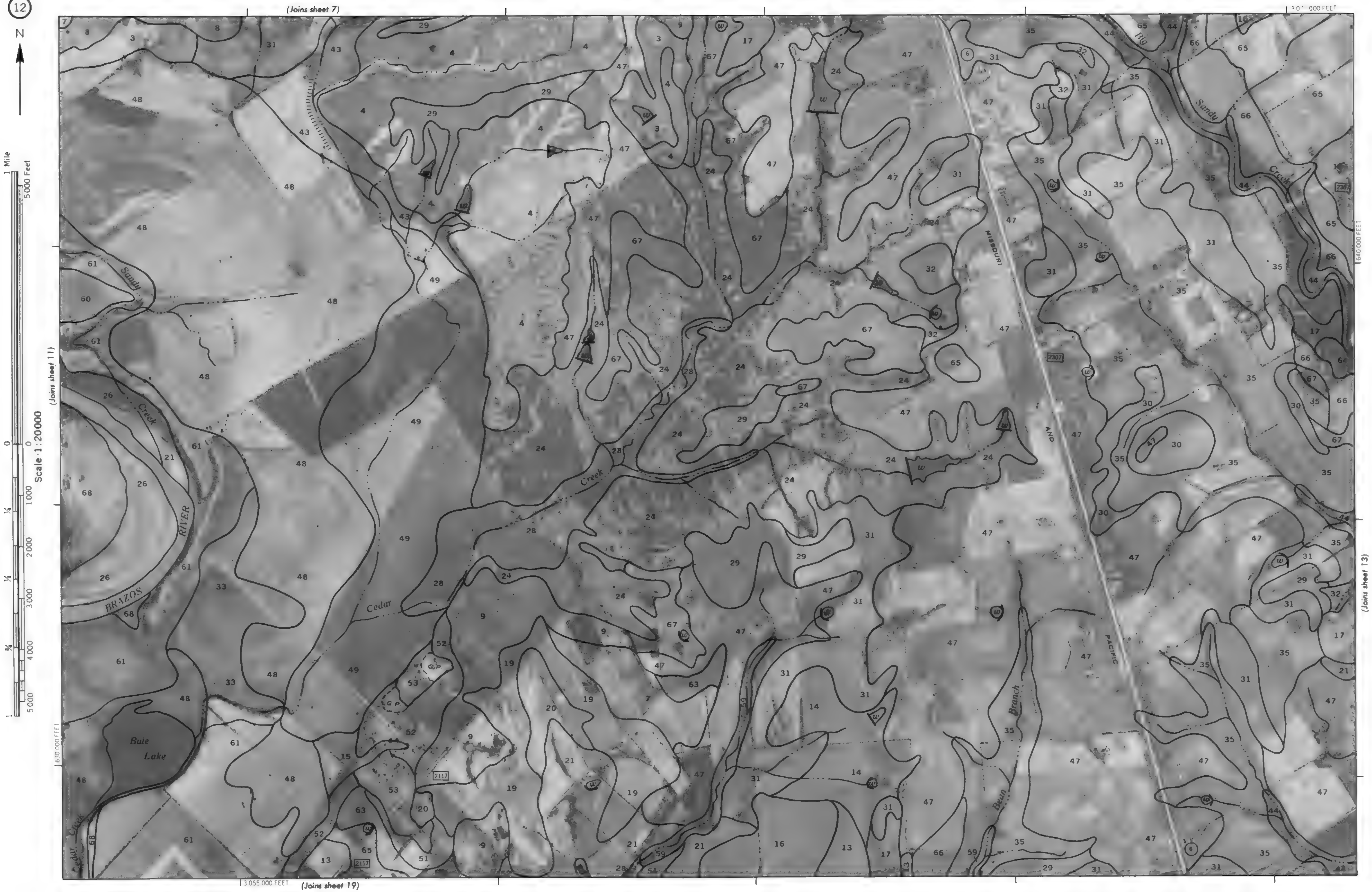
BRAZOS RIVER

GRAVEL PIT

G.P.

Cedar Creek

FALLS COUNTY, TEXAS, NO. 11


12
N
(Joins sheet 7)
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 19)
1 Mile
5000 Feet
Scale 1:20000
BRAZOS RIVER
Cedar Creek
Sandy Creek
Buie Lake
MISSOURI AND PACIFIC
2307
2117
3 055 000 FEET
630 000 FEET
640 000 FEET
FALLS COUNTY, TEXAS NO. 12

FALLS COUNTY, TEXAS — SHEET NUMBER 13

13

N

(Joins sheet 8)

3 080 000 FEET

640 000 FEET

(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 20)

3 100 000 FEET

630 000 FEET

Little Creek

Sandy Creek

Big Sandy Creek

Keechi Creek

Marlin City Lake

New City Lake

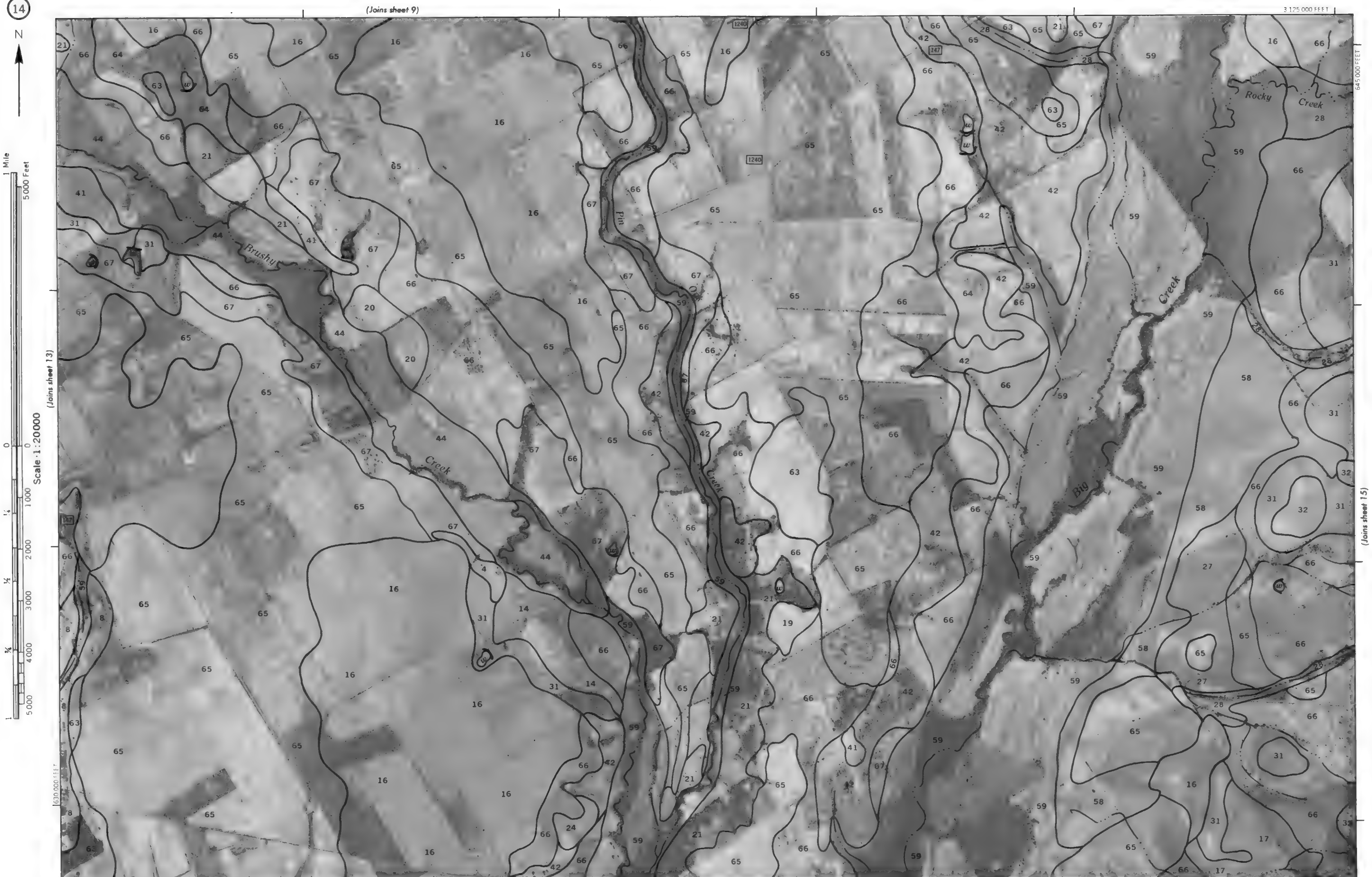
McClanahan

1 Mile

5000 Feet

Scale 1:20000

SOIL SURVEY OF FALLS COUNTY, TEXAS — SHEET NO. 13



3 105 000 FEET

(Joins sheet 21)

This map is compiled on [illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 14

FALLS COUNTY, TEXAS — SHEET NUMBER 15

15

N

3 125 000 FEET

(Joins inset, sheet 5)

645 000 FEET

Rocky Creek

LIMESTONE COUNTY

Little Brazos River

1771

(Joins sheet 14)

(Joins sheet 22)

3 150 000 FEET

630 000 FEET

1 Mile

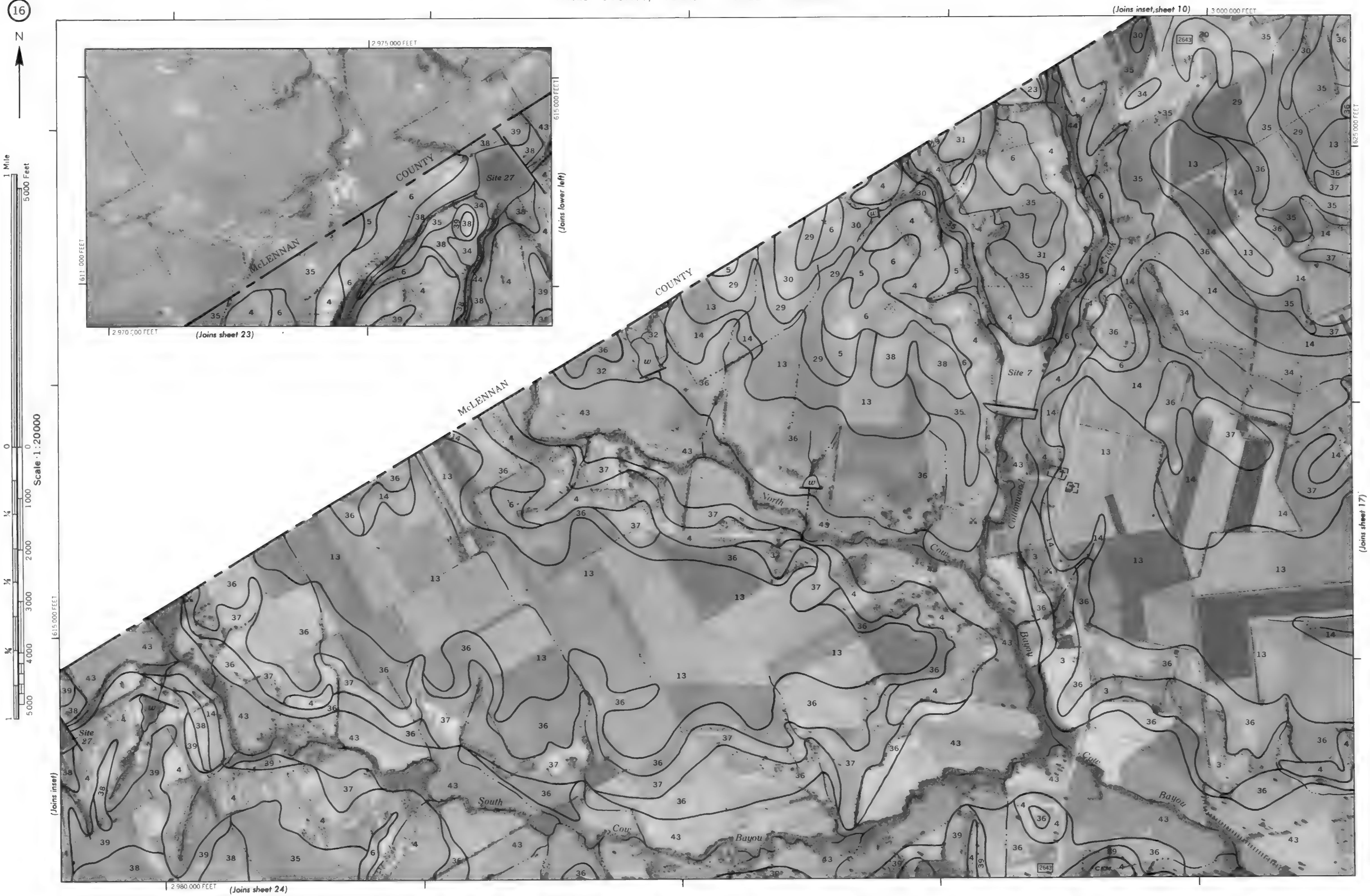
5000 Feet

Scale · 1:20000

FALLS COUNTY, TEXAS SHEET NO. 15

This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies

Coordinate grid ticks and land division controls in shown are approximate y positioned



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 16

FALLS COUNTY, TEXAS — SHEET NUMBER 17

17

N

3,005,000 FEET

(Joins sheet 10)

625,000 FEET

(Joins sheet 16)

615,000 FEET

(Joins sheet 18)

(Joins sheet 25)

3,025,000 FEET

Site 15

Site 16

Site 30

Long Branch

Bayou

Cow Bayou

Cow

Oak Creek

Post

1 Mile

5,000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS SHEET NO. 17

This map, compiled on 1974 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid lines and land division corners (where shown) are approximately positioned

FALLS COUNTY, TEXAS — SHEET NUMBER 18

18

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 11)

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 26)

3 050 000 FEET

625 000 FEET

615 000 FEET

3 030 000 FEET

Satin

Cedar Creek

BRAZOS RIVER

BRAZOS RIVER

Cow Bayou

Post Oak Creek

water

McCullough Slough

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

TEXAS NO. 18

FALLS COUNTY, TEXAS

FALLS COUNTY, TEXAS — SHEET NUMBER 19

19

N

3 055 000 FEET

625 000 FEET

(Joins sheet 12)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 27)

3 075 000 FEET

615 000 FEET

1 Mile

5000 Feet

Scale 1:20000

MISSOURI AND PACIFIC

Cedar Creek

Beam Branch

McCullough Slough

GRAVEL PIT

water

Oil Mill Lake

MARLIN
(county seat)

TEXAS NO. 19

FALLS COUNTY, TEXAS

This map was compiled on 1971 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners shown are approximately positioned

FALLS COUNTY, TEXAS — SHEET NUMBER 2

2

N

1 Mile

5000 Feet

Scale 1:20000

3 110 000 FEET

680 000 FEET

3 160 000 FEET

610 000 FEET

McLENNAN COUNTY

LIMESTONE COUNTY

LIMESTONE

Hognon Creek

Sandy Creek

Southern Pacific Railroad

Polecat Creek

Burns Branch

Branch

413

(Joins sheet 1)

(Joins sheet 5)

(Joins sheet 30)

(Joins sheet 39)

3 105 000 FEET

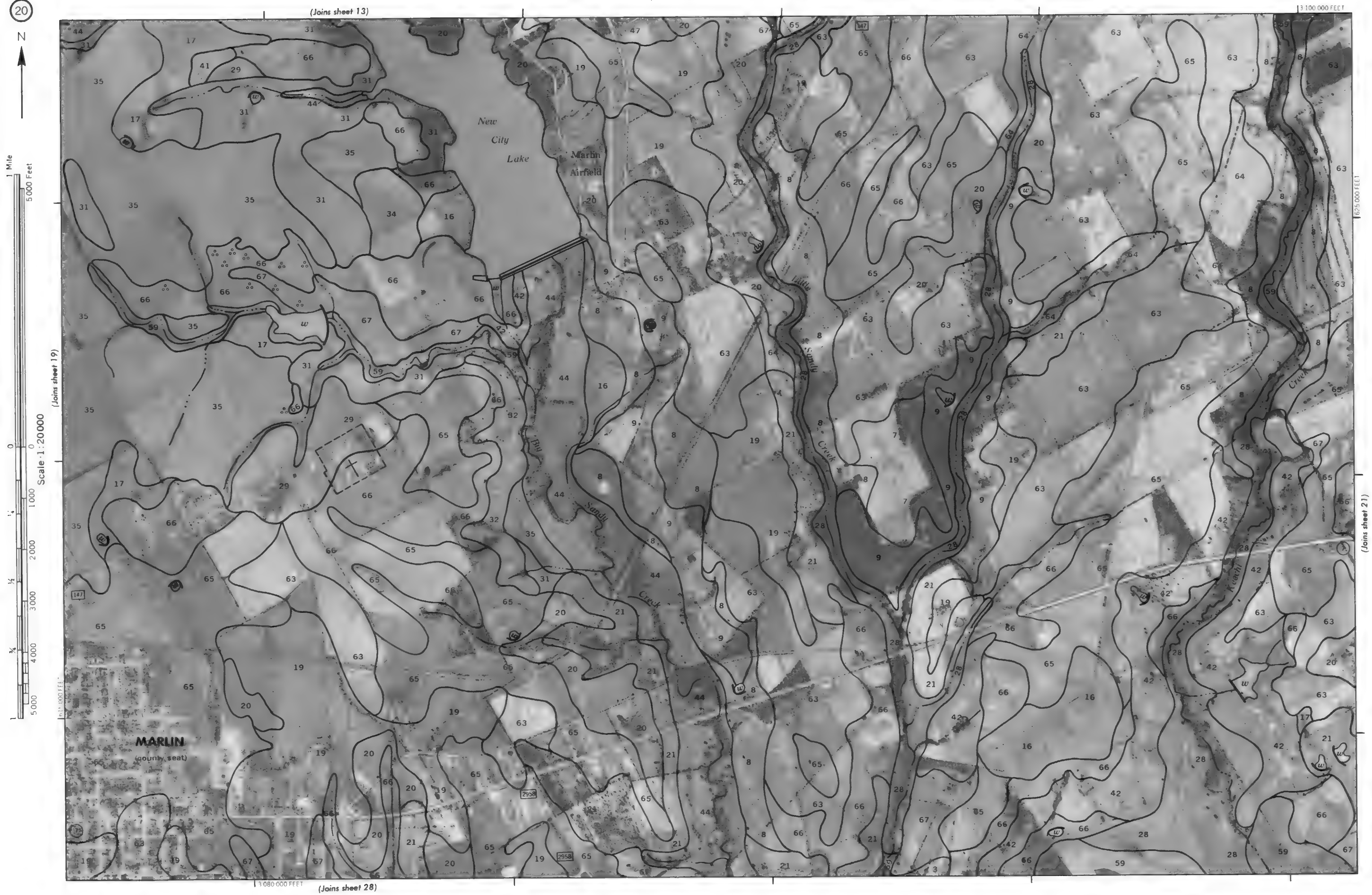
3 155 000 FEET

680 000 FEET

610 000 FEET

This map is compiled on 1974 aerial photography by the U S Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners (if shown) are approximately positioned

FALLS COUNTY, TEXAS NO. 2



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 20

FALLS COUNTY, TEXAS — SHEET NUMBER 21

N

(Joins sheet 14)

(Joins sheet 20)

(Joins sheet 22)

(Joins sheet 29)

3 105 000 FEET

3 125 000 FEET

Pin Oak Creek

Brushy Creek

Big Creek

Cedar Creek

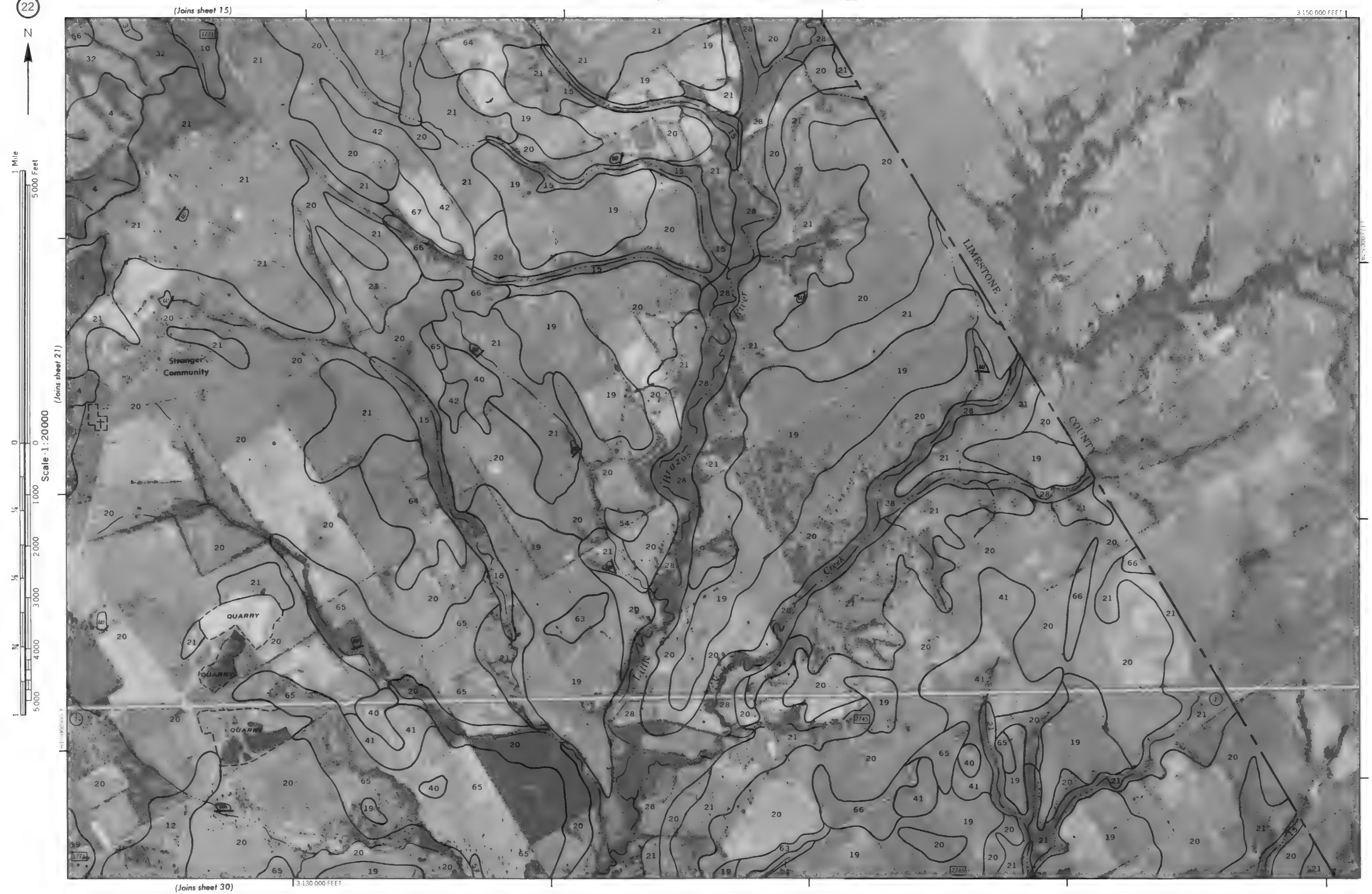
Big Creek

Elm Creek

1 Mile

5000 Feet

Scale 1:20000



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

FALLS COUNTY, TEXAS NO. 22

FALLS COUNTY, TEXAS — SHEET NUMBER 23

23

N

2 955 000 FEET

610 000 FEET

(Joins inset, sheet 16)

(Joins sheet 24)

(Joins sheet 31)

Bruceville-Eddy

McLENNAN COUNTY

BELL COUNTY

Hoolia Creek

Indian Creek

1 Mile 5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 23

FALLS COUNTY, TEXAS — SHEET NUMBER 24

24

N

(Joins sheet 16)

3 000 000 FEET

610 000 FEET

Site

Mooreville

Coul Bayou

Long Branch

Cottonwood Branch

Creek

Dry

(Joins sheet 23)

(Joins sheet 25)

2 980 000 FEET

395 000 FEET

(Joins sheet 32)

1 Mile

5000 Feet

Scale 1:20000

0 0 ½ 1000 ½ 2000 ¾ 3000 ¾ 4000 1 5000

This map is compiled on 1974 aerial photography by the U S Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners (if shown) are approximately positioned

FALLS COUNTY, TEXAS NO. 24

FALLS COUNTY, TEXAS — SHEET NUMBER 25

25

N

(Joins sheet 17)

(Joins sheet 24)

(Joins sheet 26)

(Joins sheet 33)

1 Mile

5000 Feet

Scale 1:20000

1 0 1 2 3 4 5 Miles

1 0 1 2 3 4 5 Kilometers

1 000 000 FEET

1 005 000 FEET

1 995 000 FEET

3 025 000 FEET

Cow Bayou

Post Oak Creek

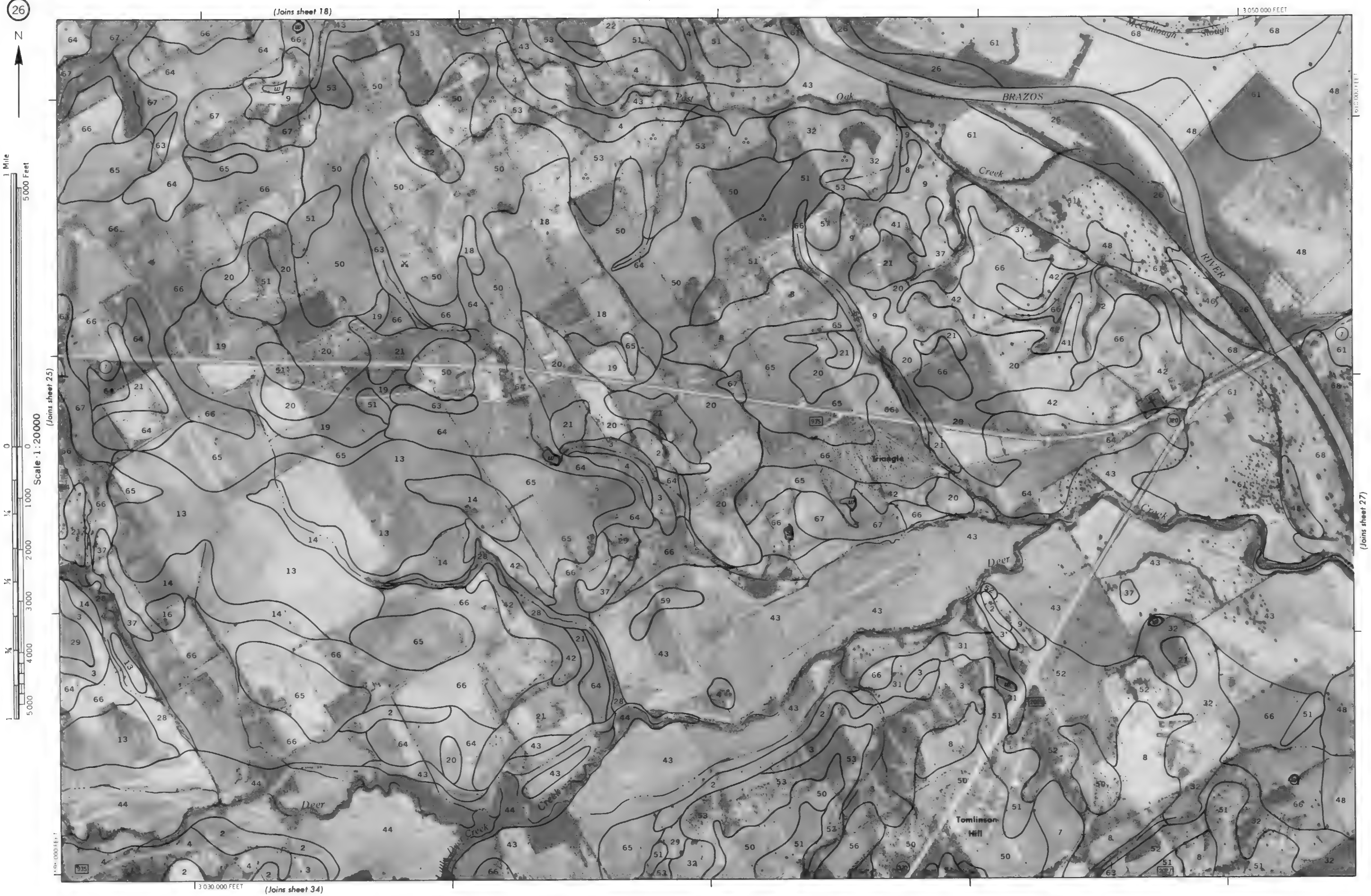
Dog Branch

Deer Creek

Chilton

FALLS COUNTY, TEXAS NO. 25

FALLS COUNTY, TEXAS — SHEET NUMBER 26



FALLS COUNTY, TEXAS NO. 26

N

MARLIN
(county seat)

McCullough Slough

Slough

Bunganay Slough

Bean Branch

McCullough Slough

BRAZOS RIVER

Deer Creek

Perry Creek

PACIFIC AND MISSOURI

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 35)

1 Mile
5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS SHEET NO. 27

FALLS COUNTY, TEXAS — SHEET NUMBER 28

28

N

(Joins sheet 20)

3 100 000 FEET

610 000 FEET

MARLIN
(county seat)

Huff
Airfield

SUNRISE

Keechi Creek

Sandy Creek

Little Sandy Creek

Big Creek

Big Creek

(Joins sheet 27)

(Joins sheet 29)

3 080 000 FEET

(Joins sheet 36)

1 Mile
5 000 Feet
Scale 1:20000
0 1000 2000 3000 4000 5000

This map was compiled on 1974 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners if shown are approximately positioned

FALLS COUNTY, TEXAS NO. 28

N

(Joins sheet 21)

(Joins sheet 28)

(Joins sheet 30)

(Joins sheet 37)

Big Elm Creek

Elm Creek

Bald Hill

Fish Creek

Rocky Creek

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 29

FALLS COUNTY, TEXAS — SHEET NUMBER 3

3

N

3,055,000 FEET

625,000 FEET

665,000 FEET

3,075,000 FEET

COUNTY

McLENNAN

Creek

Sandy

Creek

Sandy

Big

MISSOURI AND PACIFIC

(Joins sheet 4)

(Joins sheet 7)

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS, NO. 3

This map was compiled on 1941 aerial photographs by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies

Coordinate grid ticks and field drainage patterns shown are approximately positioned

FALLS COUNTY, TEXAS — SHEET NUMBER 30

30

N

(Joins sheet 22)

3 150 000 FEET

LIMESTONE COUNTY

610 000 FEET

(Joins sheet 29)

Scale 1:20000

1 Mile 5 000 Feet

0 0

½ 1 000

¼ 2 000

½ 3 000

¾ 4 000

1 5 000

GRAVEL PIT

GRAVEL PIT

River

Creek

Tucker

Brazos

Little

Branch

Creek

Pilgrim

Pilgrim

(Joins inset, sheet 2)

3 130 000 FEET

(Joins sheet 38)

FALLS COUNTY, TEXAS NO. 30

FALLS COUNTY, TEXAS — SHEET NUMBER 31

31

N

2 955 000 FEET

(Joins sheet 23)

(Joins sheet 32)

(Joins inset, sheet 45)

BELL COUNTY

Indian Creek

Hubbard Creek

Belvins Community

1 Mile

5 000 Feet

Scale 1:20000

TEXAS NO. 31

FALLS COUNTY, TEXAS

FALLS COUNTY, TEXAS — SHEET NUMBER 32

32

N

1 Mile
5,000 Feet

Scale · 1 : 20000

(Joins sheet 24)

(Joins sheet 31)

(Joins sheet 33)

(Joins sheet 40)

3,000,000 FEET

590,000 FEET

580,000 FEET

2,980,000 FEET

Cego

Indian

Creek

Grave

Hollin

Deer

1950

1239

This map was compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Cooperative grid ticks and land division corners, if shown, are approximately positioned

FALLS COUNTY, TEXAS NO. 32

N

1 005 000 FEET

(Joins sheet 25)

(Joins sheet 32)

(Joins sheet 34)

(Joins sheet 41)

3 025 000 FEET

Chlomwood Creek

Spring Creek

Deer Creek

Little Deer Creek

Miller Branch

Burkly Branch

Bonner Branch

Scale 1:20000

1 Mile

5000 Feet

FALLS COUNTY, TEXAS NO. 33

FALLS COUNTY, TEXAS — SHEET NUMBER 34

34

N

(Joins sheet 26)

3 050 000 FEET

(Joins sheet 33)

(Joins sheet 35)

3 030 000 FEET

(Joins sheet 42)

Scale · 1 : 20000

1 Mile 5 000 Feet

0 0

¼ 1000

½ 2000

¾ 3000

1 4000

1¼ 5000

Little Deer Creek

Perry Creek

FALLS COUNTY, TEXAS NO. 34

FALLS COUNTY, TEXAS — SHEET NUMBER 35

35

N

3 055 000 FEET

595 000 FEET

(Joins sheet 27)

(Joins sheet 34)

(Joins sheet 36)

(Joins sheet 43)

3 075 000 FEET

580 000 FEET

BRAZOS RIVER

McCullough Slough

Berry Creek

MISSOURI PACIFIC RAILROAD AND

Wild Horse Slough

Poole Creek

712

2027

1 Mile

5 000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 35

This map is compiled on 1974 aerial photography by the U S Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners if shown are approximately positioned

FALLS COUNTY, TEXAS — SHEET NUMBER 36

36

N

(Joins sheet 28)

(Joins sheet 35)

(Joins sheet 44)

(Joins sheet 37)

3 080 000 FEET

4 100 000 FEET

Mt Rose Community

Big Creek

Wild Horse Slough

Big Creek Run

Mussel Branch

Hog Branch

Goose Branch

MISSOURI PACIFIC

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 36

FALLS COUNTY, TEXAS — SHEET NUMBER 37

37

N

3 105 000 FEET

595 000 FEET

(Joins sheet 29)

(Joins sheet 36)

(Joins sheet 38)

(Joins sheet 45)

Fish Creek

Cross Branch

Bee Branch

Reagan

Prouty Creek

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS SHEET NO. 37

FALLS COUNTY, TEXAS — SHEET NUMBER 38

38

N

(Joins sheet 30)

3 150 000 FEET

(Joins sheet 37)

585 000 FEET

3 130 000 FEET

(Joins sheet 46)

(Joins sheet 39)

1 Mile

5000 Feet

Scale · 1:20000

Rocky Creek

Brazos River

Little Brushy Creek

Pobstal Creek

Buckhorn Creek

Willow Creek

Willow Creek

This map is compiled on 1954 aerial photographs by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies. Boundaries, if shown, are approximately positioned. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 38

3 155 000 FEET

(Joins inset, sheet 2)

595 000 FEET

Muse Bug Branch

Burns Branch

PACIFIC SOUTHERN

LIMESTONE COUNTY

Claybank Creek

Big Sandy Creek

Gray Springs Branch

ROBERTSON COUNTY

(Joins sheet 38)

(Joins sheet 47)

3 175 000 FEET

N

1 Mile

5000 Feet

0 0

Scale 1:20000

1/4 1/2 3/4

1000 2000 3000 4000 5000

FALLS COUNTY, TEXAS, NO. 39

FALLS COUNTY, TEXAS — SHEET NUMBER 4

(4)

N

(Joins sheet 1)

3 100 000 FEET

675 000 FEET

(Joins sheet 3)

(Joins sheet 5)

3 080 000 FEET

(Joins sheet 8)

McLENNAN COUNTY

Big Creek

Brushy Creek

Brushy Creek

Ollo

1 Mile

5 000 Feet

0 0

Scale 1:20000

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

1¼ 5 000

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Control by USC&GS and USGS
Coordinate grid ticks and land division corners if shown, are approximately positioned

FALLS COUNTY, TEXAS NO. 4

FALLS COUNTY, TEXAS — SHEET NUMBER 40

40

N

(Joins sheet 32)

3 000 000 FEET

1 000 FEET

(Joins inset, sheet 54)

Scale · 1:20000

1 Mile 5 000 Feet

0 0

1/2 1000 2000

1/4 3000

1/8 4000

1/16 5000

Durango

Creek

Pond

Bellfalls

935

2 980 000 FEET

(Joins sheet 48)

(Joins sheet 41)

BELL COUNTY

This map was compiled on 1:24 aerial photographs by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners shown are approximately positioned

FALLS COUNTY, TEXAS NO. 40

FALLS COUNTY, TEXAS — SHEET NUMBER 41

41

N

3 005 000 FEET

(Joins sheet 33)

(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 49)

3 025 000 FEET

Bunkly Branch

Home Branch

Live Oak Creek

Watermelon Branch

Boggy Branch

Cactus Branch

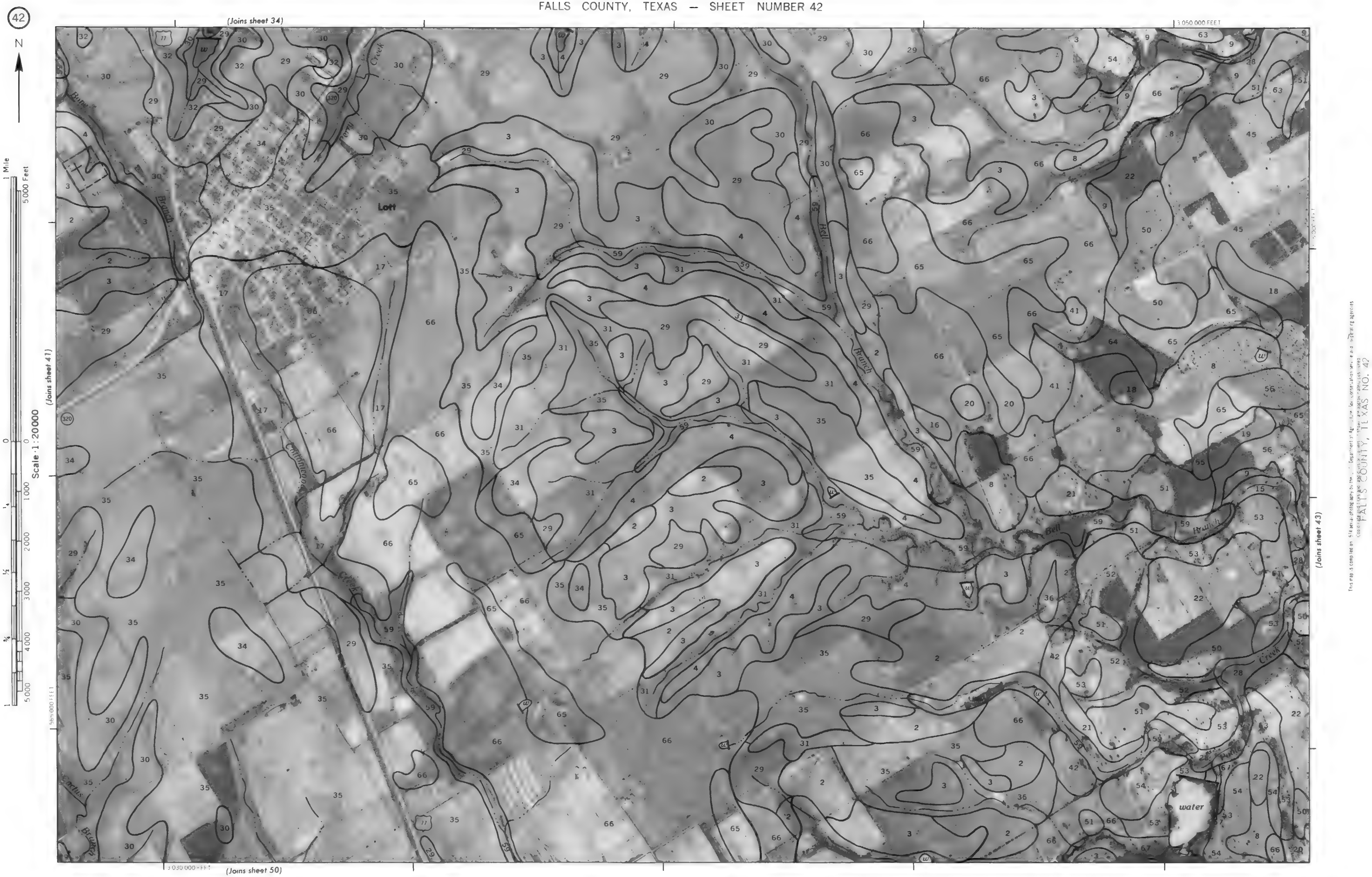
1 Mile

5000 Feet

Scale 1:20000

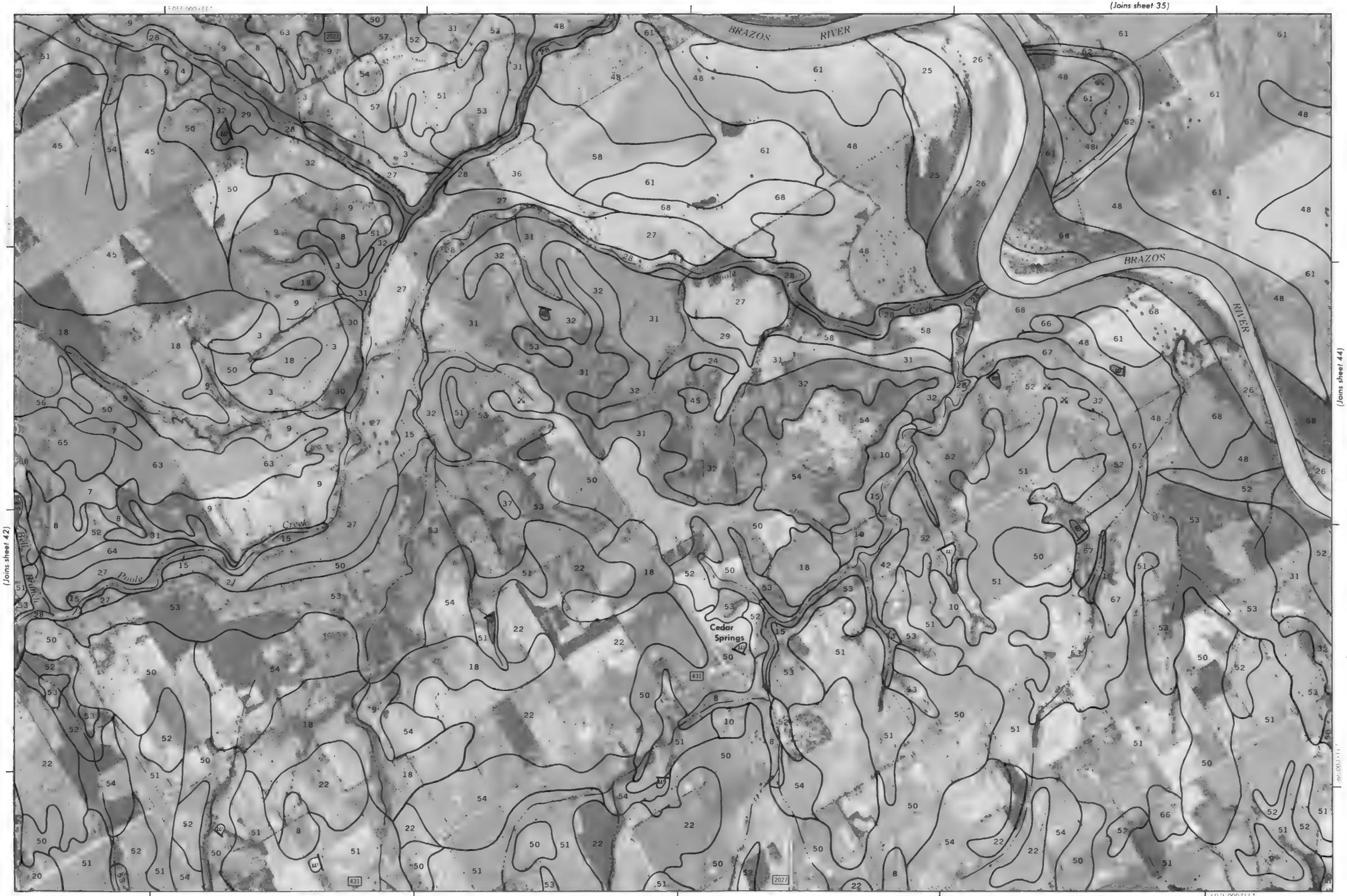
FALLS COUNTY, TEXAS, NO. 41

FALLS COUNTY, TEXAS — SHEET NUMBER 42



FALLS COUNTY, TEXAS — SHEET NUMBER 43

FALLS COUNTY, TEXAS NO. 43

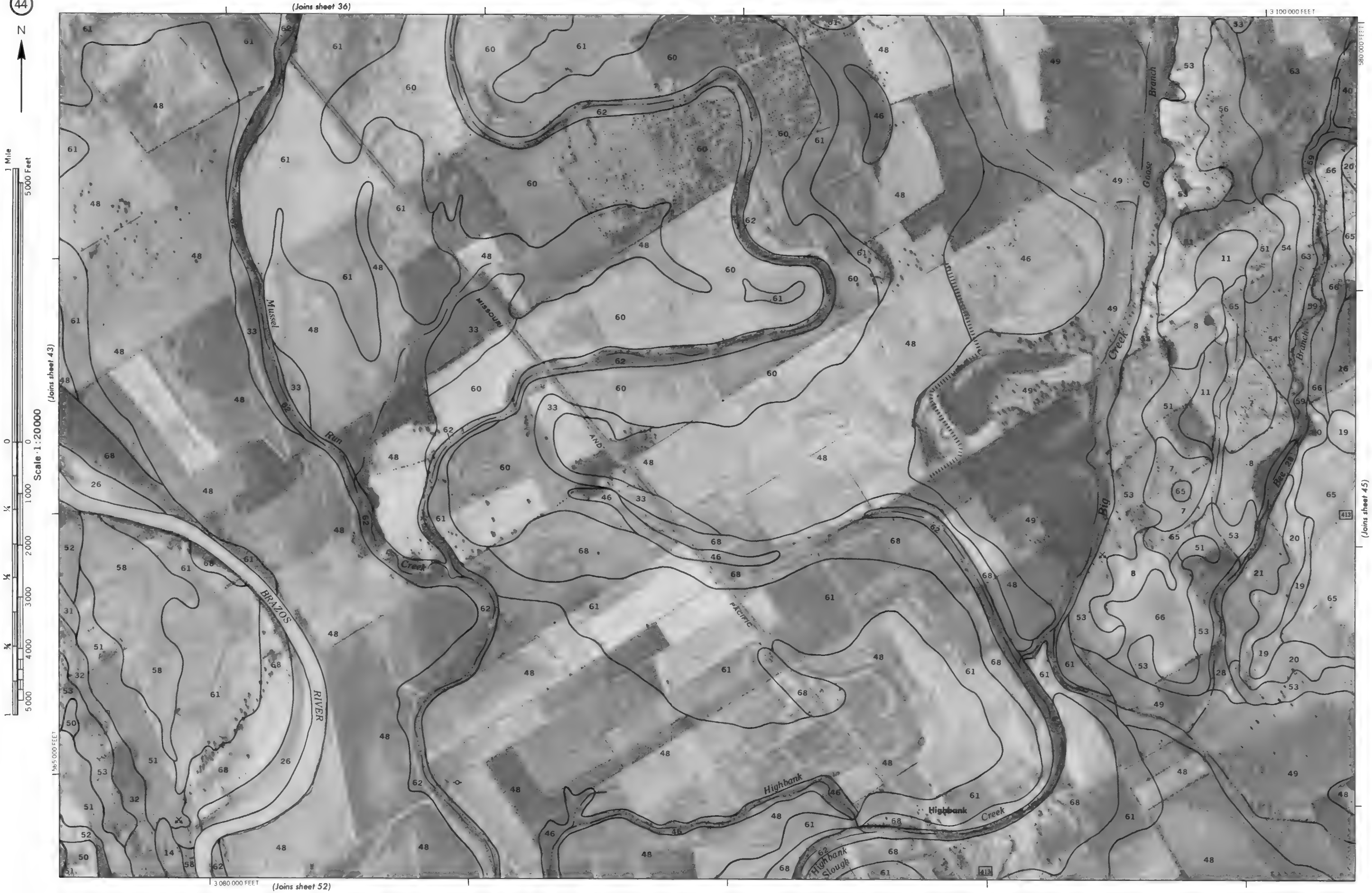


43

N

1 Mile
5000 Feet

Scale 1:20000



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 44

FALLS COUNTY, TEXAS — SHEET NUMBER 45

45

N

3 105 000 FEET

(Joins sheet 37)

(Joins sheet 44)

(Joins sheet 46)

(Joins sheet 53)

Bee Branch

Fish Creek

Little River

Brazos River

Little Copperas Creek

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS SHEET NO. 45

FALLS COUNTY, TEXAS — SHEET NUMBER 46

(46)

N

(Joins sheet 38)

3 150 000 FEET

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 45)

3 130 000 FEET

(Joins inset, sheet 47)

(Joins sheet 47)

Little Brazos River

Willow Creek

Copperas Creek

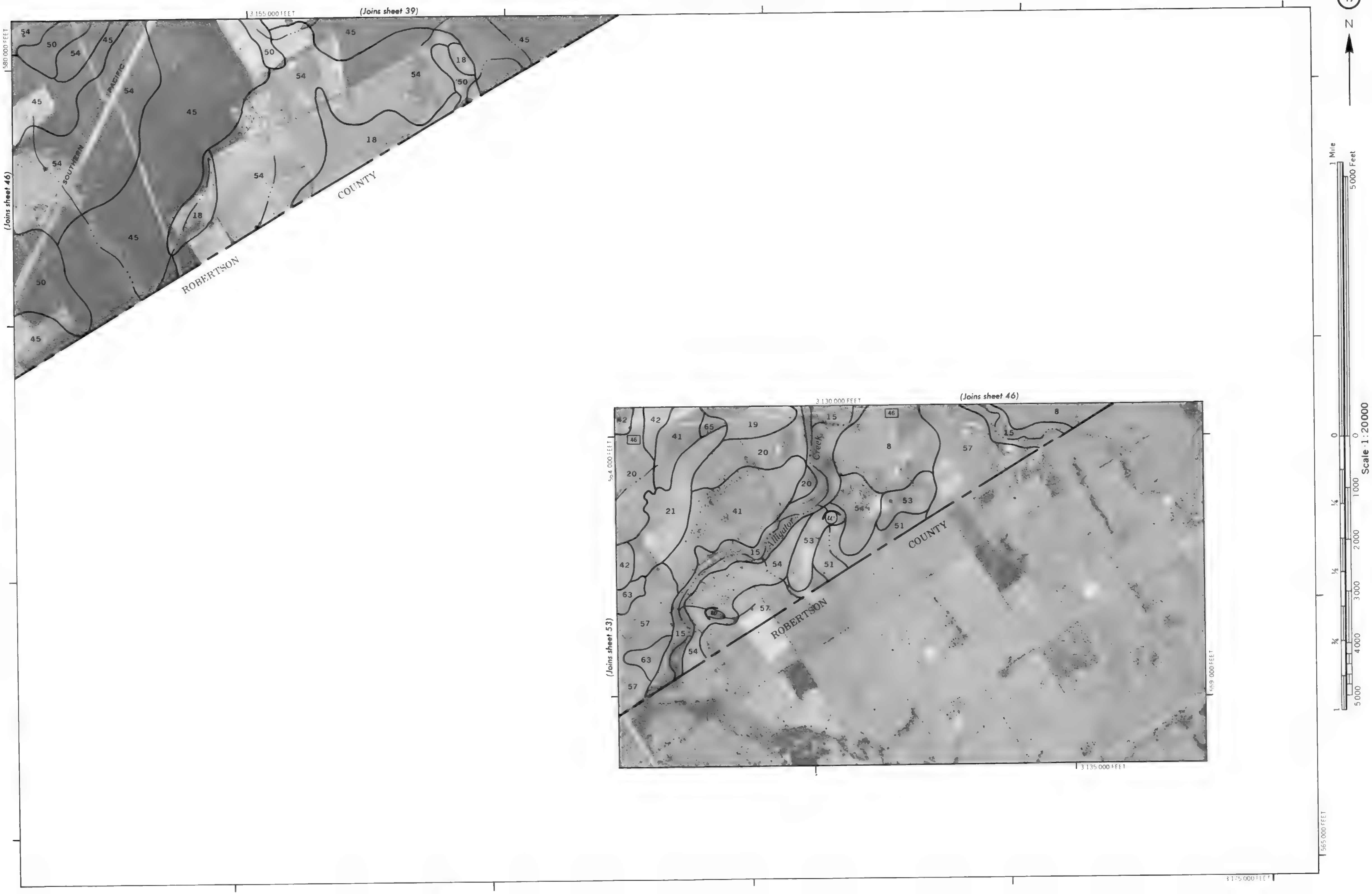
Alligator Creek

COUNTY

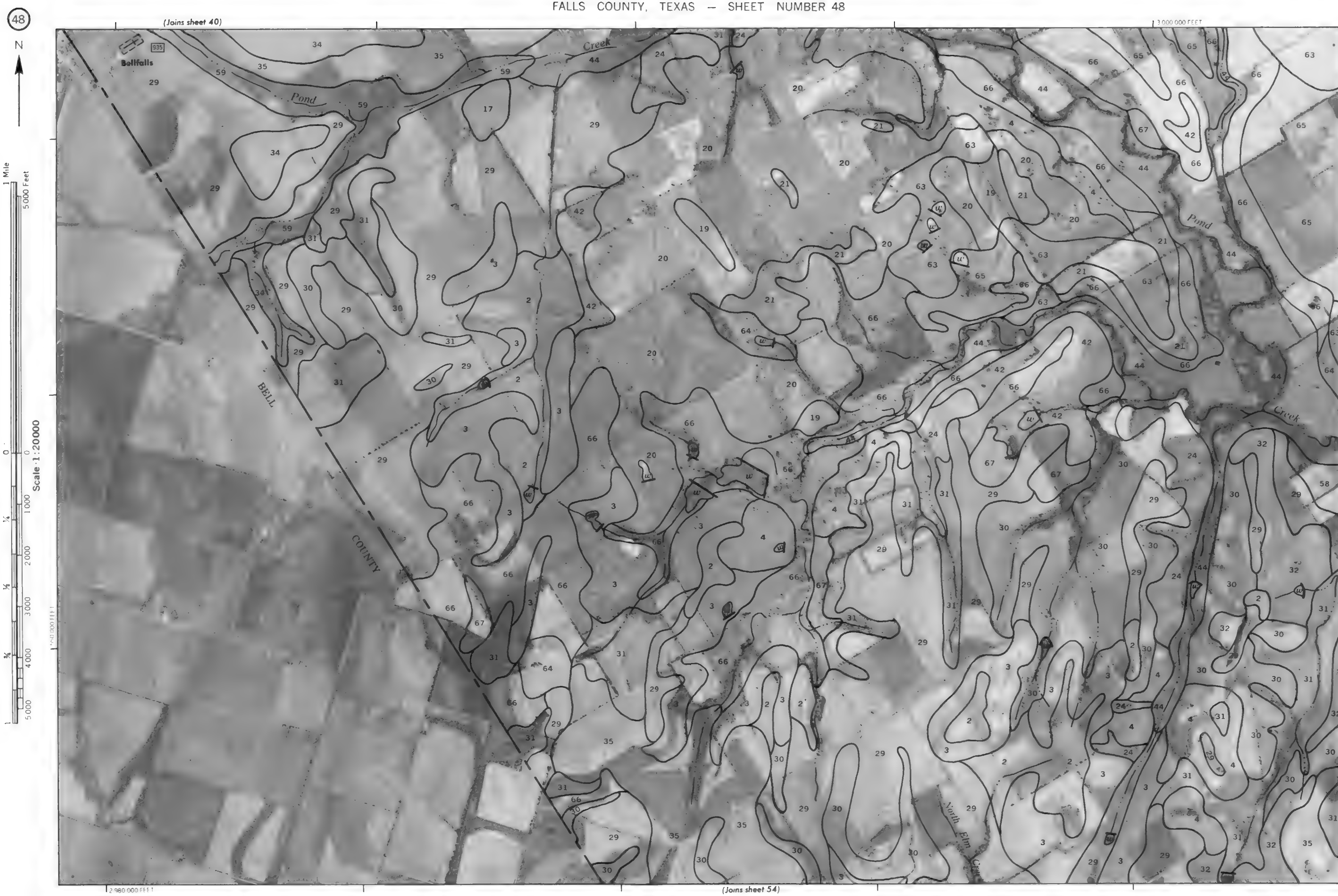
ROBERTSON

SOUTHERN

FALLS COUNTY, TEXAS NO. 46



FALLS COUNTY, TEXAS NO. 47


48
N
(Joins sheet 40)
Bellfalls
935
Pond
Creek
BELL
COUNTY
North Elm
(Joins sheet 49)
(Joins sheet 54)
3 000 000 FEET
2 980 000 FEET
Scale 1:20000
1 Mile
5000 Feet

FALLS COUNTY, TEXAS — SHEET NUMBER 49

N

3 005 000 FEET

(Joins sheet 41)

(Joins sheet 48)

(Joins sheet 50)

(Joins sheet 55)

3 025 000 FEET

Watermelon

Bogay

Branch

Pond Creek

Little Oak Creek

Brushy Creek

Pond

Creek

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS

FALLS COUNTY, TEXAS, NO. 5
This map is compiled on 1974 aerial photography at the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

3 100 000 FEET

675 000 FEET

(Joins sheet 4)

(Joins sheet 3)

3 125 000 FEET

655 000 FEET

650 000 FEET

(Joins sheet 9)

LIMESTONE COUNTY

Big Otto Creek

Hogpen Creek

Pin Oak Creek

Elm Creek

Little Elm Creek

Coffeewood Creek

(Joins sheet 15)

3 130 000 FEET

665 000 FEET

(Joins sheet 9)

3 125 000 FEET

5

N

1 Mile

5000 Feet

0

Scale 1:20000

FALLS COUNTY, TEXAS — SHEET NUMBER 50

(50)

N

1 Mile

5 000 Feet

Scale 1:20000

(Joins sheet 42)

(Joins sheet 49)

(Joins sheet 51)

(Joins sheet 56)

3 050 000 FEET

560 000 FEET

550 000 FEET

Cactus Branch

Cactus Branch

Cottonwood Creek

Cottonwood Creek

Huy Creek

Travis

77

431

3145

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

FALLS COUNTY, TEXAS NO. 50

FALLS COUNTY, TEXAS — SHEET NUMBER 51

3 055 000 FEET

(Joins sheet 43)

N

Gum Branch

Hog Creek

Pleasant Grove

1 Mile

5 000 Feet

Scale 1:20000

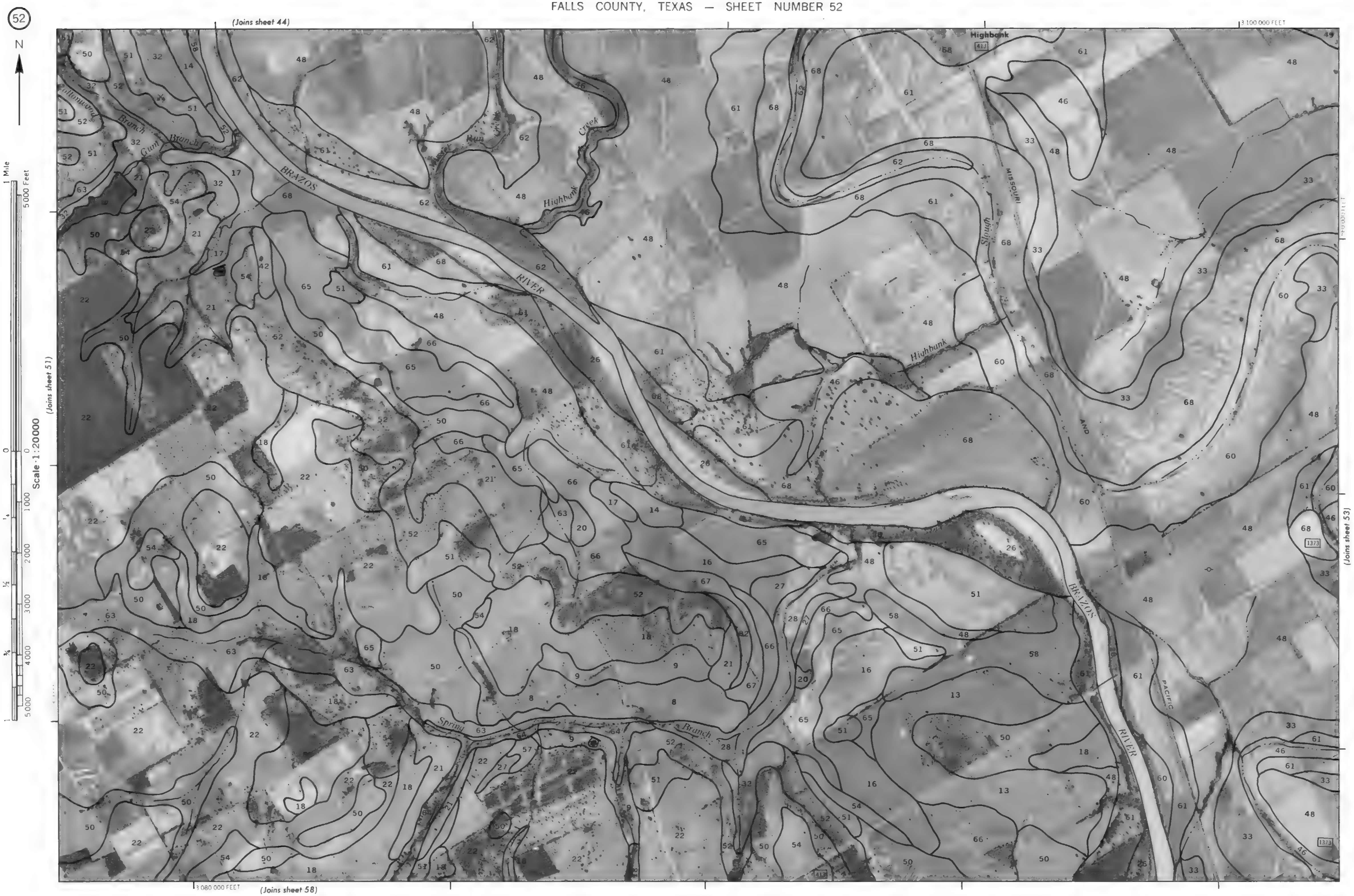
(Joins sheet 52)

(Joins sheet 50)

(Joins sheet 57)

3 075 000 FEET

FALLS COUNTY, TEXAS, NO. 51


52
N
(Joins sheet 44)
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 58)
3 100 000 FEET
3 080 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Highbank
BRAZOS RIVER
Highbank Creek
Missouri Slough
Highbank
Spring Branch
Cottonwood Branch
Gum Branch
Pacific
FALLS COUNTY, TEXAS NO. 52

FALLS COUNTY, TEXAS — SHEET NUMBER 53

N

3 105 000 FEET

(Joins sheet 45)

(Joins inset, sheet 47)

(Joins sheet 52)

(Joins inset, sheet 58)

3 112 000 FEET

Big Creek

Little Fish Creek

Brazos River

Coppers Creek

Alligator Creek

Flat Lake Creek

Little Coppers Creek

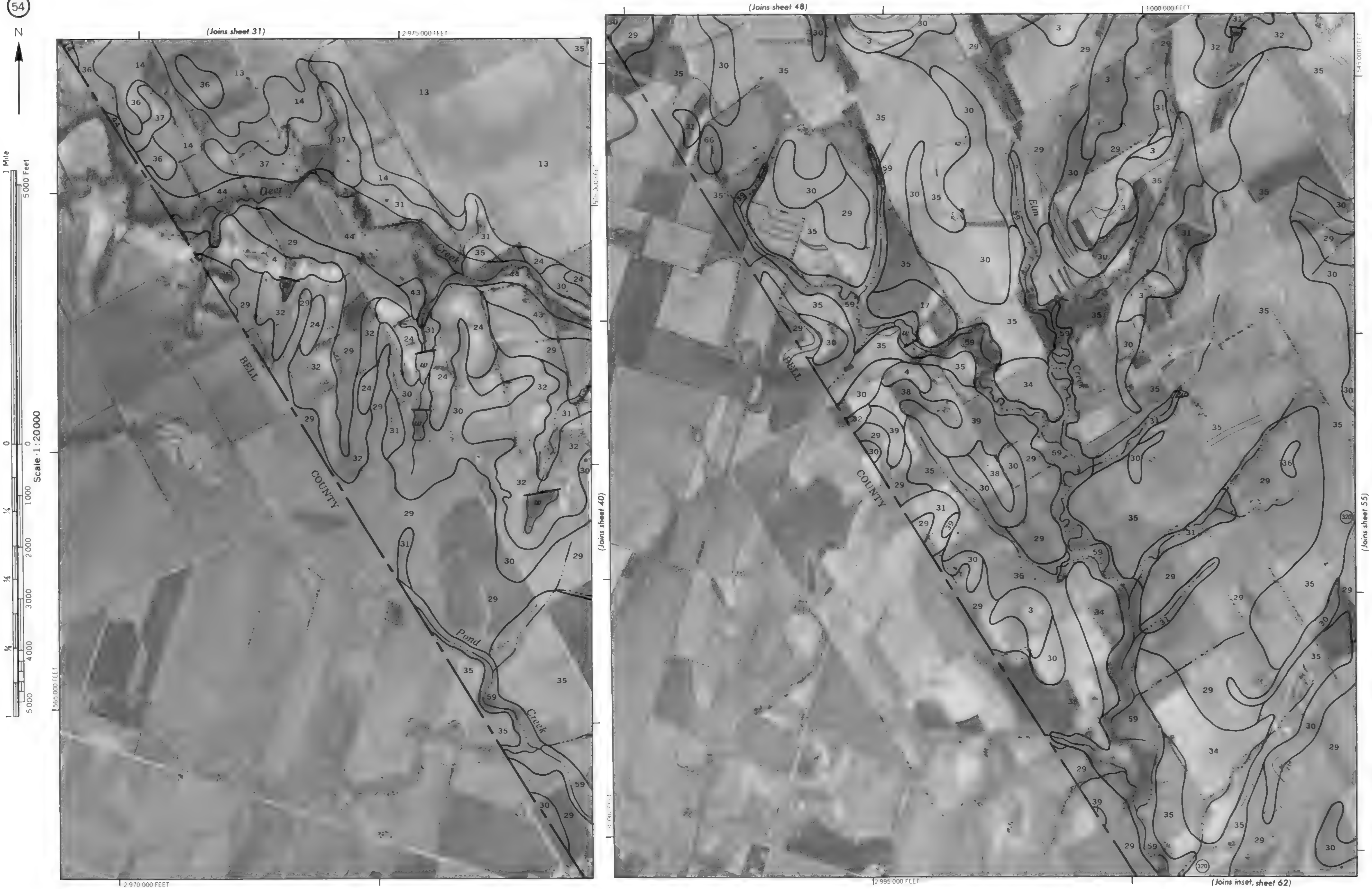
ROBERTSON COUNTY

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 53



FALLS COUNTY, TEXAS NO. 54

FALLS COUNTY, TEXAS — SHEET NUMBER 55

FALLS COUNTY, TEXAS, NO. 55

(Joins sheet 49)

(Joins sheet 54)

(Joins sheet 56)

(Joins sheet 59)

3,005,000 FEET

3,025,000 FEET

Westphalia

Little Pond Creek

Pond Creek

Brushy Creek

Keys Creek

55

N

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS — SHEET NUMBER 56

56

N

(Joins sheet 50)

3 050 000 FEET

(Joins sheet 55)

1 Mile
5 000 Feet

Scale 1:20000

Cactus Branch

Pond

Creek

Pond

Creek

Cottonwood Creek

Salt Creek

1048

ROSEBUD

1 030 000 FEET

(Joins sheet 60)

(Joins sheet 57)

FALLS COUNTY, TEXAS NO. 56

FALLS COUNTY, TEXAS — SHEET NUMBER 57

FALLS COUNTY, TEXAS NO. 57

3 055 000 FEET

(Joins sheet 51)

(Joins sheet 56)

(Joins sheet 61)

(Joins sheet 58)

Big Brushy Creek

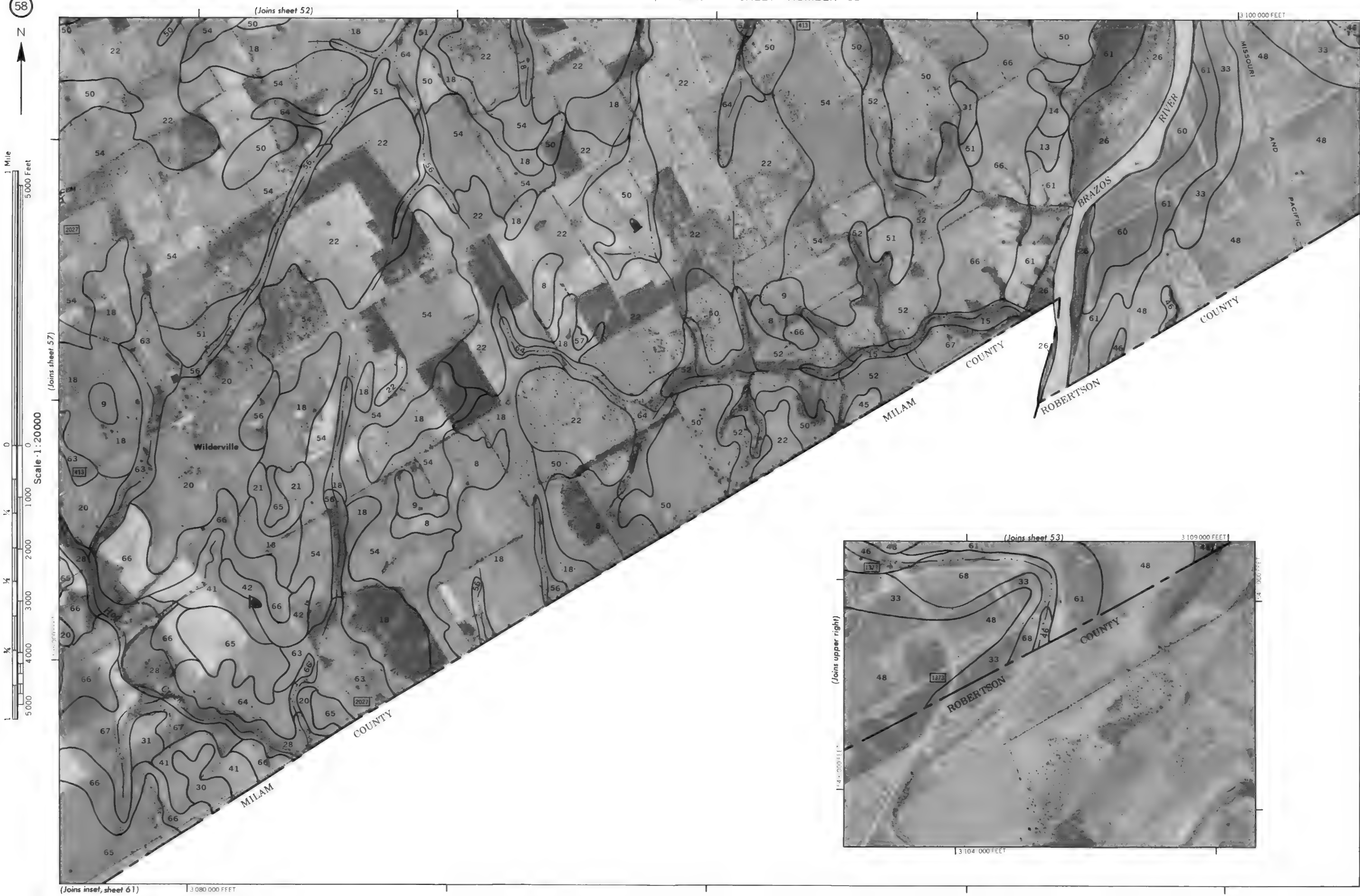
Hog Creek

1 Mile

5000 Feet

Scale 1:20000

N



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 58

FALLS COUNTY, TEXAS — SHEET NUMBER 59

59

N

3 005 000 FEET

(Joins sheet 55)

(Joins inset, sheet 62)

(Joins sheet 60)

(Joins sheet 62)

3 025 000 FEET

Brushy Creek

Keys Creek

Little Pond Creek

Zipperlandville Community

Terry Chapel

BELL COUNTY

1772

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 59

FALLS COUNTY, TEXAS — SHEET NUMBER 6

6

N

3 026 000 FEET

647 000 FEET

644 000 FEET

3 021 000 FEET

(Joins sheet 10)

(Joins lower left)

McLENNAN COUNTY

Bull Hide Creek

434

3 050 000 FEET

660 000 FEET

(Joins sheet 7)

BRAZOS RIVER

McLENNAN COUNTY

GRAVEL PIT

Sandy Creek

645 000 FEET

(Joins inset)

3 030 000 FEET

(Joins sheet 11)

1 Mile

5000 Feet

0

0

Scale 1:20000

1

½

¾

1

½

¼

0

1 000

2 000

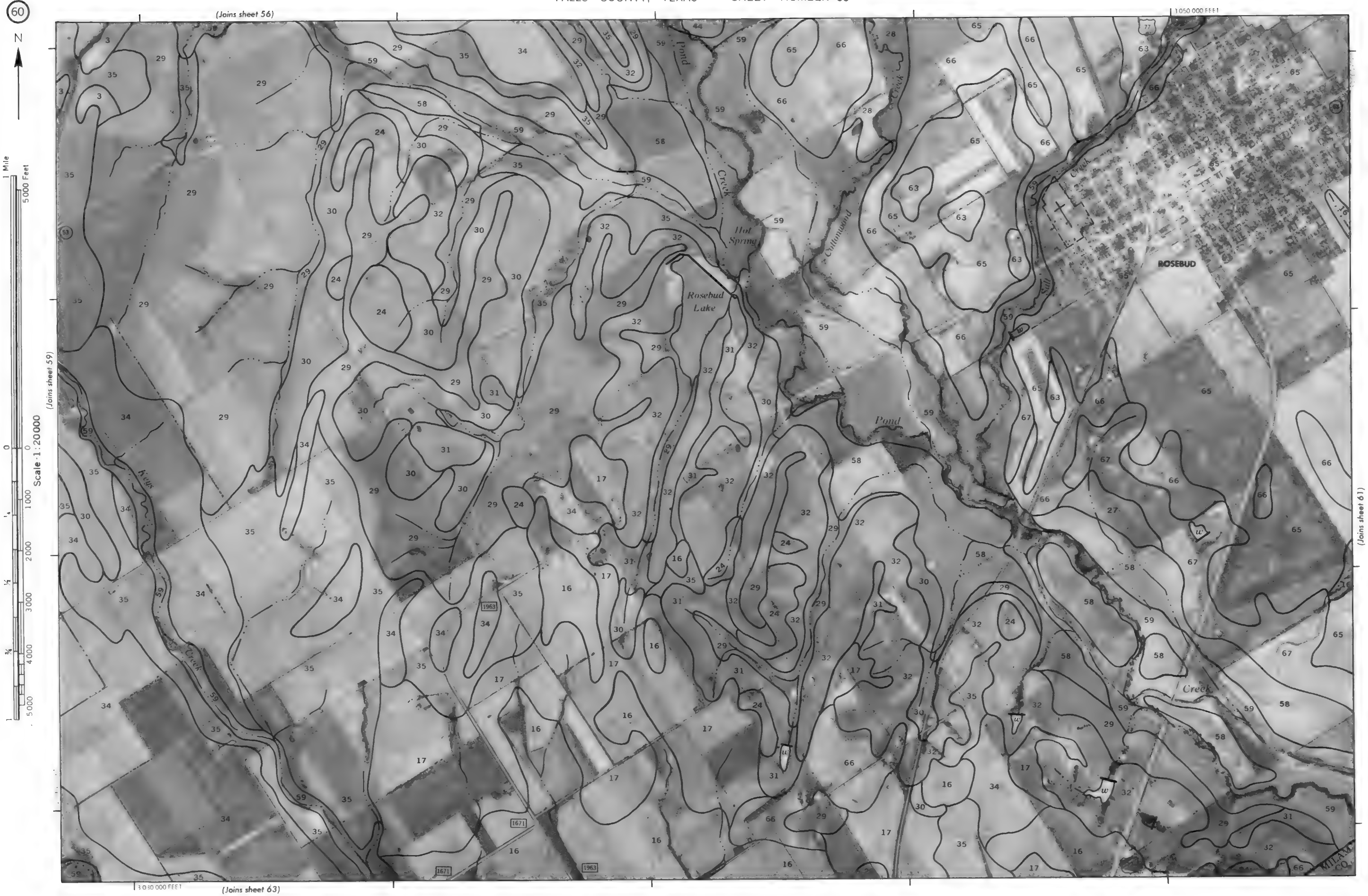
3 000

4 000

5 000

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners if shown are approximately positioned

FALLS COUNTY, TEXAS NO. 6



FALLS COUNTY, TEXAS NO. 60

FALLS COUNTY, TEXAS — SHEET NUMBER 61

61

N

(Joins sheet 57)

(Joins inset)

3 055 000 FEET

ROSEBUD

Big Elm Creek

Pond Creek

FALLS COUNTY

INDEFINITE BOUNDARY

MILAM COUNTY

(Joins sheet 60)

3 075 000 FEET

(Joins sheet 58)

3 078 000 FEET

(Joins upper right)

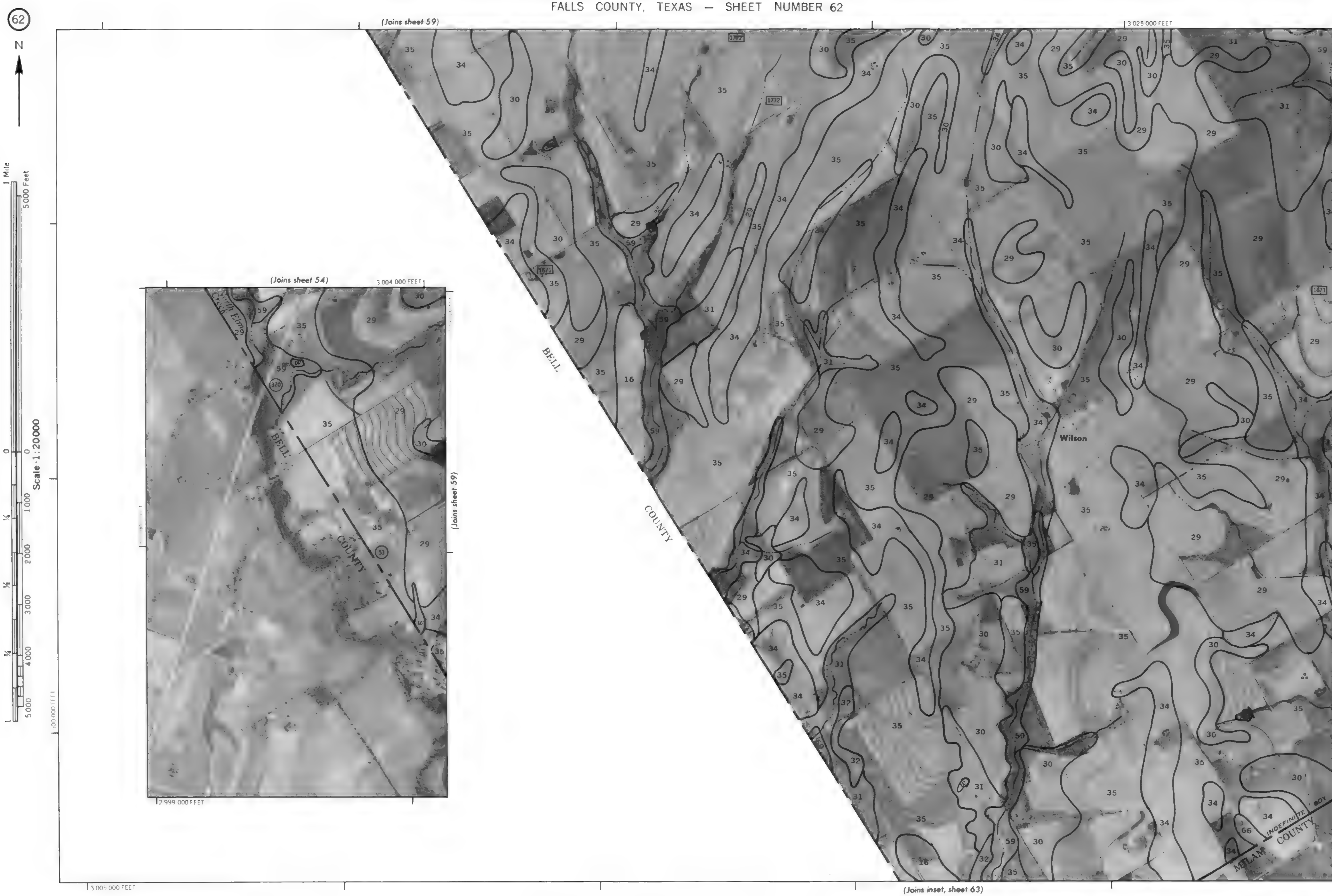
3 081 000 FEET

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 61



This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS NO. 62

FALLS COUNTY, TEXAS — SHEET NUMBER 63

63

N

3 030 000 FEET

(Joins sheet 60)

510 000 FEET

(Joins sheet 62)

Keys Creek

Little Pond Creek

SOUTHERN PACIFIC

MILAM COUNTY

INDEFINITE BOUNDARY

1671

1963

3 020 000 FEET

(Joins sheet 62)

498 000 FEET

BELL COUNTY

MILAM COUNTY

INDEFINITE BOUNDARY

3 025 000 FEET

4000 AND 5000 FOOT GRID TICKS

1 Mile

5000 Feet

Scale 1:20000

1000 2000 3000 4000 5000

1 0 0

¼ ½ ¾

300 000 FEET

3 050 000 FEET

FALLS COUNTY, TEXAS—NO. 63

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FALLS COUNTY, TEXAS — SHEET NUMBER 7

McLENNAN COUNTY

3 055 000 FEET

660 000 FEET

(Joins sheet 3)

(Joins sheet 6)

(Joins sheet 8)

(Joins sheet 12)

3 075 000 FEET

645 000 FEET

7

N

Creek

Sandy

Big

PACIFIC

MISSOURI

Perry

1240

1 Mile

5000 Feet

Scale 1:20000

FALLS COUNTY, TEXAS NO. 7

This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and field division corners, if shown, are approximately positioned.

FALLS COUNTY, TEXAS — SHEET NUMBER 8

(8)

N

(Joins sheet 4)

3 100 000 FEET

660 000 FEET

(Joins sheet 7)

(Joins sheet 9)

645 000 FEET

3 080 000 FEET

(Joins sheet 13)

Scale 1:20000

1 Mile 5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Keechi Creek

Little Sandy Creek

Brushy Creek

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FALLS COUNTY, TEXAS NO. 8

FALLS COUNTY, TEXAS — SHEET NUMBER 9

FALLS COUNTY, TEXAS, NO. 9

This map is compiled on 1971 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

3 105 000 FEET

1660 000 FEET

(Joins sheet 5)

(Joins sheet 8)

(Joins sheet 14)

3 125 000 FEET

(Joins inset, sheet 5)

1650 000 FEET

Hogtown Creek

Cottonwood Creek

Big Creek

Pin Oak Creek

LIMESTONE COUNTY

Little Elm Creek

Big Elm Creek

1240

147

9

N

1 Mile

5000 Feet

Scale 1:20000